TECHNOLOGY DEPT.

The TOOL ENGINEER

First Copy

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DETROIT

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When, How and Why
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Handy Andy's Workshop
(As good as ever)
See Pages 32 and 34.

News of A.S.T.E.
See Page 19.

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See Page 20 for Details

JULY
1937

Official Publication of the
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OF TOOL ENGINEERS

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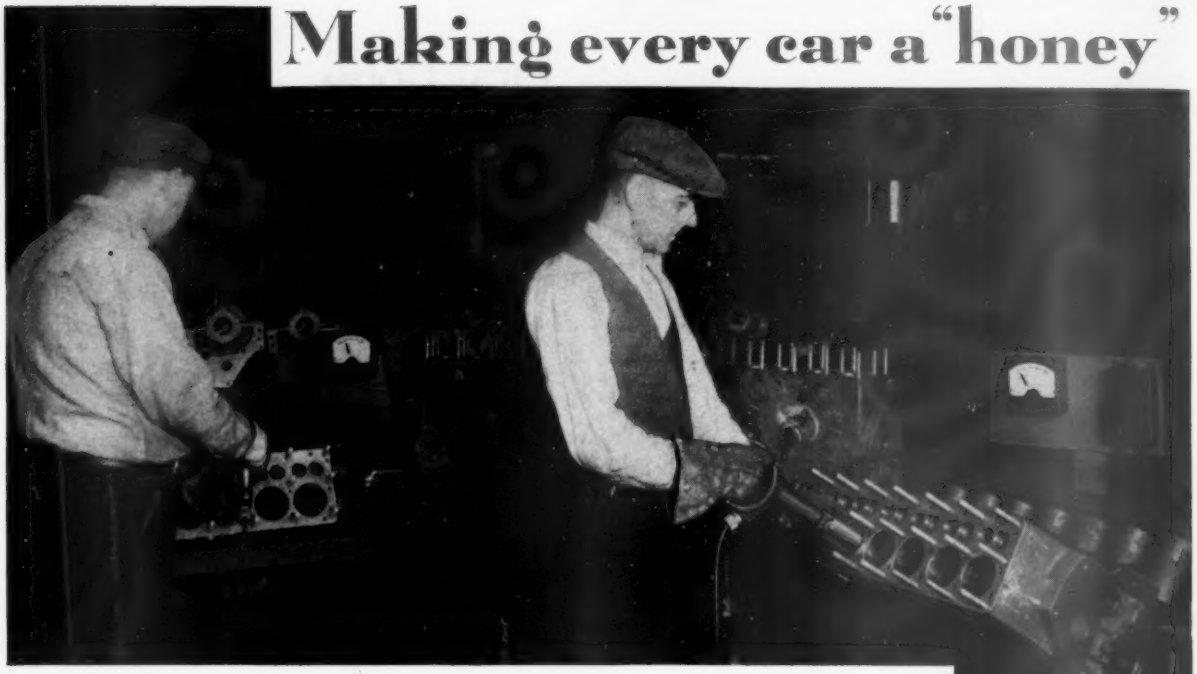

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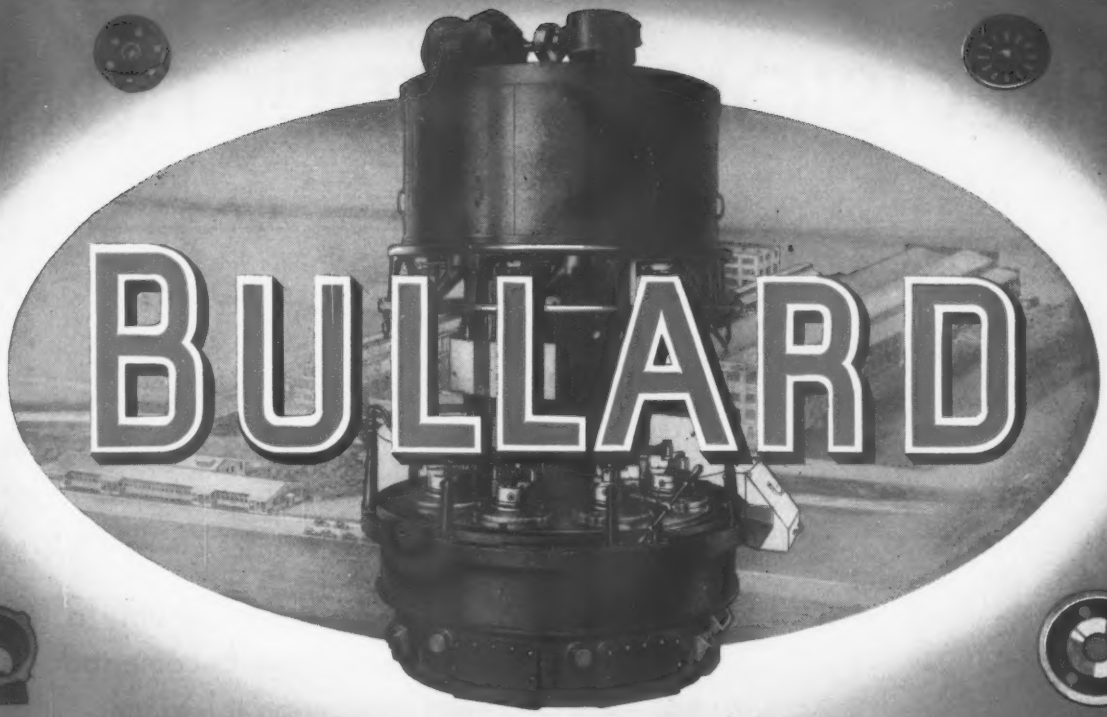

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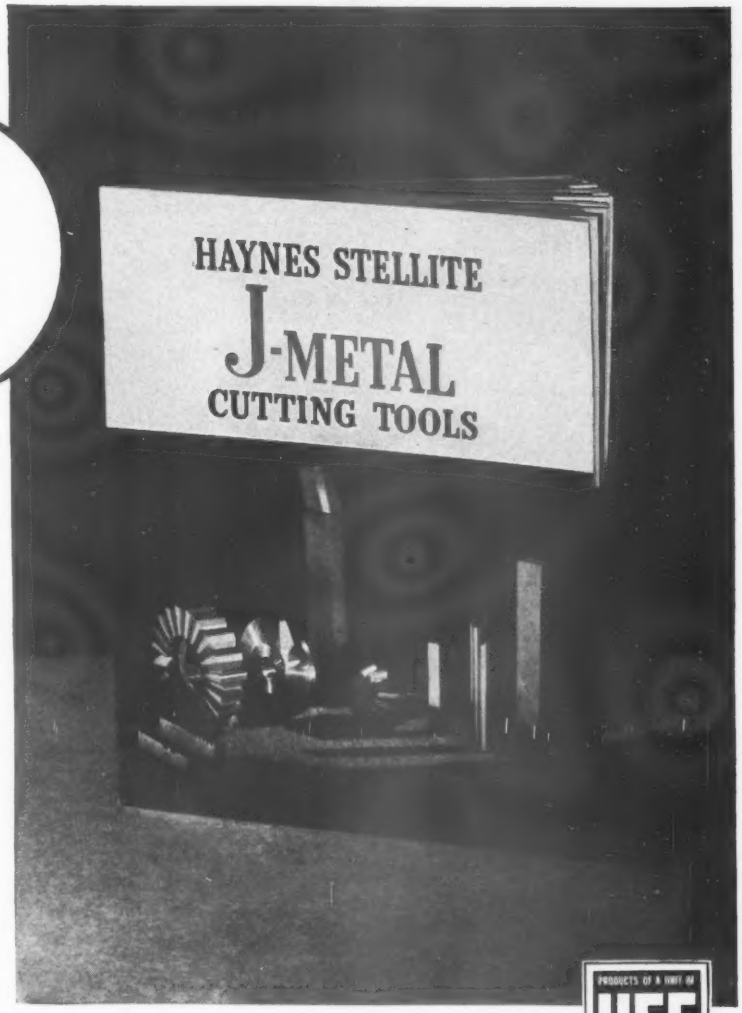

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The Tool Engineer

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Official Publication of the AMERICAN SOCIETY OF TOOL ENGINEERS

Vol. VI JULY, 1937 No. 3

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Owing to the nature of the American Society of Tool Engineers organization, it cannot, nor can the publishers be responsible for statements appearing in this publication either as papers presented at its meetings or the discussion of such papers printed herein.

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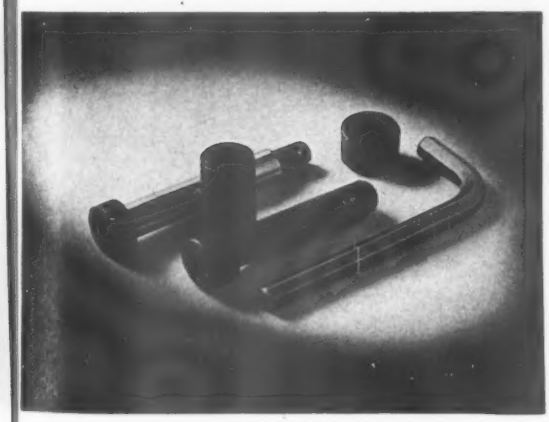

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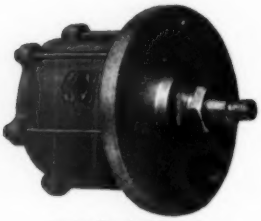

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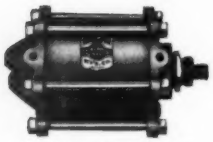

Model BR—double acting air cylinder

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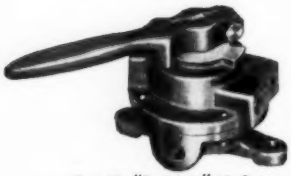

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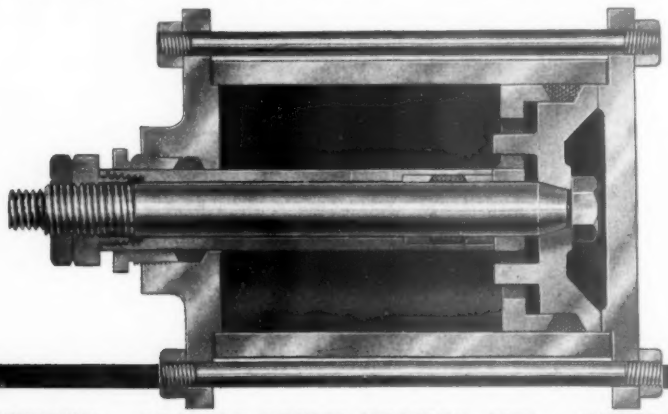

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Letters

Please send full particulars and application blank for membership in the American Society of Tool Engineers;—and subscription information concerning "The Tool Engineer", which seems to be just the type of trade journal I have been looking for. The February issue was a "dandy" and I would like to secure a copy for my files as the first issue of my subscription.

I am employed as a Tool Designer in the Farmall Works of the International Harvester Company—and well acquainted in Tri-City Industrial plants, where I believe I could serve your interests to good advantage.

Respectfully,
(Signed) E. W. Peterson
1224 Third Street "A"
Moline, Illinois.

We shall be very happy to work with you in establishing a branch of A.S.T.E. in your area, and trust that others who read this will communicate with you or this publication to assist in getting your chapter started.—Editor.

▼ ▼ ▼

I am very much interested in your Society for Tool Engineers and would like to know if I am eligible to join. I am the Tool and Die Designer at the Steel and Tubes, Inc., Superior Div., Elyria, Ohio.

Yours very truly,
(Signed) George R. Hall
Tool & Die Designer

Complete details have been sent you from national headquarters of A.S.T.E. All tool and die designers of at least five years experience are eligible for A.S.T.E. membership.—Editor.

▼ ▼ ▼

5012 N. Fairhill Street
Phila, Pa.
June 11th, 1937

American Society of Tool Engineers,
2842 West Grand Blvd.,
410 Curtis Bldg.,
Detroit, Mich.

Attention: Mr. Roy T. Bramson

Gentlemen:—

Received your letter of June 8th and certainly am very much interested in promoting a branch for the Society.

I would appreciate receiving from you more detailed information in reference to this work, also initiation fees.

Many thanks in advance.

Very truly yours,
Fred G. Schutz

Full details, literature, etc., have been sent. There are several hundred readers who have been receiving this publication for many months in your area, Mr. Schutz, and we hope that many of these will communicate with you in establishing your chapter in Philadelphia.—Editor.

▼ ▼ ▼

We have been receiving monthly copies of your excellent magazine "The Tool Engineer."

We would like to know your regular subscription price of this magazine, without membership to the Engineer's Society, if such arrangements are possible.

If the magazine is not furnished without membership to the Society, please advise if our head toolmaker is eligible for membership. He is not an engineer by actual training, but is qualified as a designer and builder of tools of all types.

Yours very truly,
Electric Specialty Company
By D. G. Shepherd.

"The Tool Engineer" is not sold on a subscription basis. Practical manufacturing and manufacturing executive experience, rather than a college degree in engineering (although we have a great many members with degrees) qualify for A.S.T.E. membership.—Editor.

United We Stand...

by

A. E. RYLANDER

ENGINEERING societies and management may well consider, these days, the consequences to industry to shop crafts organizers arrogating bargaining rights for hourly rate engineering workers. This is a potential threat to industrial progress, to the professional standing of the engineer just starting his career as well as to all engineers. Tool Engineers are creative. They have the mathematical and analytical mind which quickly analyzes the alluring promises. With few exceptions the job of designer is the stepping stone to bigger undertakings—is not static, but the beginning of a career. The live man sees it in that light.

I have, personally, maintained that engineers belong on the side of management, a contention that assumes a deeper significance at a time when management is sorely in need of cooperation and sympathy with mutual problems. This in nowise implies inclusion with management, except as individuals be appointed to high executive positions. Obviously, the rank can't crash in where not asked. For certainly the engineers —the Tool Engineers anyway—are the brains of mass production. Tool Engineering development is needed now more than at any other time.

The matter is serious enough for unbiased consideration, may easily become acute if too long ignored. Intensive tooling and methods programs are essential to offset rising labor and material costs; even the mooted question of standard and automatic machinery may have to be decided in favor of the latter. Speed-up will be resisted, is being resisted, so, we must evolve improved equipment, tooling, methods to produce more goods with lesser man effort. That is a job for engineers, whose creativeness would be considerably handicapped by outside influence.

We can, of course, split hairs over the status of the engineer, debate the comparative professional standing of the highly qualified designer with the recent graduate breaking in as a detailer. Let's not quibble!—all men, engaged in engineering work, who subscribe to the ethics of the game come under an inclusive heading. Certainly Tool Engineers, who have fathered mass production and who (at this early stage) are largely the product of the School of Experience—plus!—subscribe to all its essentials. Evolving unity out of chaos, selling the world on a new and better idea, encouraging mechanical progress, promoting mutual good fellowship, understanding, friendliness, the American Society of Tool Engineers is assuming a unique place in industry, in engineering, is scaling the heights. Let's not slip, nor weaken our foundation. A threat to the rights of the member as a free individual is a threat to the structure. We can't permit that.

There are, of course, other factors to consider, among them the prejudice of ignorance against labor saving machinery. True, the motives inspiring such equipment have not always been altruistic, but whatever the motives the results have been good. We know that improved methods and automatic equipment spread employment by promoting mass buying due to lowered costs, in the manufacture of the equipment itself. But everybody doesn't know that, hence, an educational campaign in favor of improved equipment would be a profitable enterprise. The sooner we begin educating the public the better. It is suggested that, as a starter, we obsolete the term "labor saving" equipment in favor of a streamlined innovation—"Labor Serving Equipment"—from now on.

OUTSTANDING CONTRIBUTIONS

Made by the Machine Tool Builders to the Mass Production of Automobiles

By

F. W. CEDERLEAF

Ex-Cell-O Corporation,
Detroit, Michigan

As given before Joint Meeting of A.S.T.E. and A.S.M.E.

EACH step in the advancement of automotive design has been directly or indirectly felt by many of the affiliated industries which necessitated their making changes or similar improvements to keep abreast of the new development. This is especially true with the machine tool builders who can vouch for the fact that the ever changing demands of the automobile builder are the primary incentive for changes and improvements made in design and manufacture of machinery during the past several years. The benefits of these improvements thus made have been felt through all industries where machine tools are used.

Automotive Plant—Proving Ground for Machine Tools

One of the automotive engineer's major functions is to make the public unconsciously dissatisfied with the cars they are driving today by offering them a better car at a lower cost each year. This automatically dictates to the machine tool builder that the next year's production equipment must produce higher quality parts with lower labor costs. There is a never ending demand for closer tolerances, trouble-free automatic operations, less down time and more pieces per hour in conjunction with the demand that the machine be more or less standard or flexible so that it can be retooled for the next year's parts with a minimum of change. These demands have been responsible for keeping the machine tool engineers on their toes so that they can keep in step with the progress of the industry.

No machine tool manufacturer can meet these demands alone, any more than can one automobile company succeed due to its own individual efforts. Mr. F. C. Pyper sounded the keynote to engineering progress in his paper delivered before the S.A.E. in January of this year. He says:

"In the early days of the automobile, each manufacturer developed his own processes of fabrication and carefully guarded them from his competitors. It was reasoned that any policy approaching an exchange of ideas and experiences would result in a certain uniformity of operation which would, in a measure, destroy competition.

Competition and Co-operation

"Before we, as engineers, can properly gage our progress, we must recognize the fact that the present policy of the manufacturer to share his experiences with competitors has been a most important factor in the developing of machinery and equipment.

"Contrary to the early belief, this policy has not resulted in a duplication of practice, but instead we see today as great a difference in our process of manufacture as ever in the history of the automobile.

"The reason for this difference is not necessarily due to a difference of opinion as to the efficiency of equipment. Nor is it because of an important diversion of thought as to methods of manufacture. Selection of equipment must always be based upon such governing factors as volume requirements, necessary accuracy, financial investment involved, existing equipment; in short, its adaptability to the specific requirements."

Today there no longer exists any doubt as to the value of the exchange of ideas among so-called competitors. As a simple example of this comes to mind: A manufacturer of automotive poppet valves was requested by his customer to copper plate the stems after finish grinding. No trouble was encountered with the inlet valve but all attempts to plate the silichorme exhaust valve were unsuccessful. Outside plating experts were called in but they were equally unsuccessful. Feeling satisfied that it could not be done, the manufacturer loaded his portfolio with the failures and presented them to the customer, only to be shown some beautiful samples of "just what we want" which had been submitted by the competitor.

A visit to the competitor's plant was quickly arranged and a careful comparison of the methods used disclosed that the only apparent difference between the two plating installations was that the competitor's was new, while the other was several years old. Finding nothing else wrong, a new plating tank was built and all new equipment was provided, with the result that the part plated without difficulty.

About a year later the competitor called this manufacturer and, reminding him of his visit, requested information as to just what he had done to overcome the trouble, and he now was in a similar jam and could not figure out what had happened. It did not take long for him to find that he now needed clean equipment.

Contrary to the general impression that some advertisements attempt to convey to the readers, the improvements offered by the machine tool builder each year in his product, are not revolutionary but to the contrary very gradual and well in keeping with the refinements released by the automotive industry each year. There is no more danger of a machine tool manufacturer bringing out a new product which would render obsolete all other similar purpose machines now in use, than there is of an automobile concern bringing out a new automobile that would force every owner by economic necessity to scrap his present car and purchase the new one.

Many theories have been advanced giving reasons why the world's progress must be slow, which are beyond the bounds of this paper, but we do know that it is not due to any shortage of revolutionary suggestions and ideas. I believe it was Mr. Kettering who said "It isn't what you know that counts, but it's what you get done." Likewise, Mr. Kettering has been credited with stating that all the instruments and machines in his research laboratories in Detroit were used for the single purpose of "penetrating the human skull."

It is the duty of the Master Mechanic of a manufacturing plant to supply the production departments with tools which will produce parts to their engineering tolerances

when operated by unskilled men with a minimum amount of supervision. Obviously, his job is never completed. First, his department must prove it can be done by doing it, which he finds is really easier than keeping it done. Each foot of progress must have wedges applied to the rear wheels to keep it from backing up on him.

Slow Progress

Progress is slow. It has taken ten years to reduce the tolerance in the diameter of a cylinder bore from .001 to .0005. In 1926 the majority of the automobile companies specified a tolerance of .001 limit for out of round and taper in cylinder bores. Today only two or three are able to produce these bores to within .0005 out of round and taper. This doesn't mean that the industry has been standing still during these ten years. There has been a steady progress toward the goal demanded by the automotive engineer, namely, better quality at a lower cost. There is hardly a branch of industry that has not felt this demand and any prolonged failure to heed it, soon found that company out of the race.

There were times during these ten years when the automotive engineer demanded a better product. Whenever complaints came from the field of excess oil consumption, piston slap and noisy engine, he would shrug his shoulders and merely state that these troubles did not occur on the experimental engines and therefore if the shop would build the parts to print, they wouldn't happen. As better measuring instruments became available, he was able to prove his contentions, with the result that the spotlight remained focused on the manufacturing division. Unable to obtain greater precision machine tools at that time, selective assembly was the only recourse.

At times field trouble was traced to cylinder bores being out of square with the crank line. Attempts were made to correct this trouble by using a piloted boring bar with single tool as a substitute for the final floating reamer operation. There were two objections to this method. First, it necessitated a feed of about $\frac{1}{32}$" per revolution instead of $\frac{3}{16}$" feed per revolution, readily obtained with the multiple blade reamer; second, it was difficult to hold size with the single point high speed tool bit. Consequently, most manufacturers went back to the floating reamer—let the piston ring boys hold the bag for a while.

Came Cemented Carbide

Even this new cutting tool alloy could not revolutionize the industry over night as none of the then existing machine tools could operate at the proper surface speed for this new material to produce its greatest efficiency.

But the automotive engineer dictated and the Machine Tool Industry responded, with the result that today carbide tipped tools running at a surface speed of 400 feet in spindles with bearings made for this service, are producing cylinder bore alignment formerly only obtained with piloted boring bars; and in addition, holding a less than .0005 tolerance much more readily than the .001 limit formerly attempted with floating reamers. Instead of the eight to ten different size pistons, plus the fish scale assembly, it is now possible to get along with one to four sizes of pistons and near interchangeable manufacturing.

To record all engineering, experimenting and capital invested to reduce the .001 tolerance to .0005, would require volumes, and would cover all industries including machine tools, cutting tool manufacturers, steel companies, measuring instrument companies, gage manufacturers, abrasive industries, bearing manufacturers, etc.

During these ten years the equipment developed for the express purpose of improving the tolerances on the cylinder bores of automotive engines, included new reaming machines, new honing machines, new hone holders and hones, new measuring instruments, new reamers and floating reamer holders, new cutting materials, new cutter grinders and many other products that were offered as a method to obtain this objective.

Let us dwell for a moment on the cycle of progress as it pertains to finishing a round cylinder bore in an automotive engine, and note the part the machine tool plays in this picture. As the date of introduction of high speed steel more or less coincides with the date when automobile production passed from the experimental stage to the production stage, we can start from this point and ignore the carbon steel era.

The first picture we see, back about 1906, is single spindle boring machines operated by skilled men, using single point high speed tools in piloted boring bars, traveling at about 80 R.P.M. or a surface speed of 80 to 100 feet per minute, at a feed of about .015" per revolution, or a cutting time of 4 minutes per six inches. Even in those days the allowable tolerance probably did not exceed .0015" out of round or taper of bore.

Next to enter the picture, as mentioned before, was the high speed multiple blade reamer which did not change the revolution per minute of the spindles but did increase the feed to about $\frac{3}{16}$" feed per revolution, which brought the cutting time down to one-third of a minute. By using various ingenious floating holders and special reamer grinders, the tolerance was reduced from .0015 to .001 and the skilled operator replaced with an unskilled man.

This method with various minor changes continued from about 1926 to 1935 when the first production machines were built for the specific purpose of taking advantage of the new cemented carbide tools. Mainly due to the high cost of this new material, a single point tool was again used, but the surface speed was increased to about 400 feet per minute with the resulting spindle speed increased to around 400 R.P.M. and the feed reduced to approximately .007 feed per revolution which increased the cutting time to about 2 minutes.

However, this operation as it stands today, can be handled by an ordinary production operator who can produce bores day after day, having a bored finish never dreamed of by the skilled toolmakers of 25 years ago, holding roundness consistently to less than .0005 variation, easier than this same skilled mechanic could have bored them to a .002 tolerance with tool room equipment available at that time.

Future Developments

If the past cycle of cylinder boring is any criterion of future devel-

"The Automotive Engineer dictates, the Master Mechanic assumes the responsibility, and the Machine Tool Industry responds. Let us consider briefly a few examples of the extent of thought, research, and experimental development put forth by the tool industry to meet the automotive engineer's efforts to make your driving a pleasure and an economic necessity in your every day life."

opment, it is logical to predict the next step to be a tungsten carbide multiple blade reamer operating at 400 surface feet and a $\frac{3}{16}$" feed per revolution. To accomplish this would require considerable development of reamer grinders and lapping machines, and likewise, possible changes on reaming spindles.

Piston pin bores in pistons have been another one of these elusive tasks for the master mechanic to lay awake nights about. Just about the time he thought he was all set, material would be changed, or tolerances reduced or pistons made lighter, any of which would upset his whole production lineup. The two principal problems were size and alignment of holes.

Before the present use of precision boring machines (which is almost universal) for this operation, most plants attempted to obtain alignment by piloted boring bars using high speed steel tool bits, and then obtained size with solid reamers piloting in previously bored holes, the pistons being held by hand in some cases to prevent distortion. As the cost of these solid reamers was excessive, many attempts were made to use adjustable types but without much success. One concern increased the life of the solid reamer from 1,000 holes to 10,000 holes per reamer by reverting back to carbon steel instead of high speed steel. This was based on the principle that as the reamer was used for sizing and did not operate t surface speeds detrimental to the temper of the tool, advantage was taken of the denser alloy carbon steel as compared with the saw tooth edge structure of high speed steel.

The demands for a more positive means of obtaining closer tolerances on piston pin bores were started to be felt by the machine tool industry about 1928. The automotive engineer again created the demand. He decided to increase the compression in his engine with the result that he got piston pin knocks. Fitting the pin tighter in the piston got rid of the knocks but caused piston scoring due to the fact that when the pin expanded in length after the engine was heated, it took the piston with it, pressing skirt against cylinder wall with sufficient pressure to cause scoring. This was before the days of tin plating.

Two diameter piston pins and two diameter piston pin holes were tried but they were costly. One method used successfully for a long time was a piston pin with a saw slot added to the free end, reducing the press fit friction in the hole and yet having sufficient tension to prevent pin knock. In order to obtain an economical life of pin hole reamers, a tolerance of .001 was allowed in pin hole in piston which necessitated selective grading and fitting of pins in assembly. This also meant that the bronze bushing in the small end of the connecting rod had to be machined to various sizes to suit the pin size as too much clearance at this point also produced a pin knock.

From Laboratory to Production

It was at this time that the precision boring machine stepped out of its laboratory class and went into production. The results were so superior to reaming that the engineering department immediately reduced the limits in the small end of the rod from .001 to .0004. Specifying this limit and obtaining it were two different things. The use of plug gauges varying in size by .0001 were used for accepting or rejecting the work and there were many battles between production and inspection as to the exact size of the hole.

The gauge maker stepped into the breach with an indicating gauge that read the same for all concerned, which, although settling the argument as to correct size, also disclosed an out of round condition that was not shown with the plug gauges. To correct this condition, considerable testing was required to find ways and means of clamping part without distortion.

Today practically all piston pin holes in pistons and connecting rods are bored in precision boring machines using diamonds for the non-ferrous metals and the tungsten and tantalum carbide tools for iron and steel alloy parts. Standard tolerances vary from .0002 to .0003 and regular production operators turn out up to 180 parts per hour to this limit with less difficulty than a skilled toolmaker can ream a hole to double this tolerance and with alignment never before attained by any method.

Licking a Tough One

A few of the makers of high price cars found a way out of pin trouble by using oil holes drilled in the connecting rod, allowing oil to be forced from the crankshaft bearing through the rod to the piston pin. This method was successful but generally considered too expensive for the makers of cars in the lower price brackets. However, one company in desperation finally decided to tool for it and hoped the master mechanic, with the help of the machine tool and cutting tool engineers, would find a way to bring the cost of drilling this long hole, which at that time was about 7 cents per rod, down to an economical figure.

The first machines used were so-called "rifle drillers" using a high speed steel tipped oil drill with a hollow shank, gripped in a friction type chuck, so set that when the drill failed to cut at the set feed, the chuck would turn, stopping the machine. Cutting oil was forced through the center of the drill at a high pressure, forcing chips out through the drill flutes. As was expected, the tool cost was high and production per machine very discouraging. At the end of the first production year, after these drillers had been installed, the tool cost for the oil hole drilling operation was 3 cents per rod.

During the next three or four years, several other machine tool companies had at the request of the master mechanics, started work on this problem. Today the same operation is performed but in quite a different manner. Ordinary, conventional, extra length twist drills have replaced the tubular oil rifle drill. A hydraulic controlled feed has replaced the friction chuck and the drill enters the connecting rod to a predetermined depth, is automatically withdrawn and then returned at rapid traverse to within .005 or .010 of its previous stopping point. The labor cost of drilling has now been reduced considerably and the drill cost per rod is approximately 3/10 of a cent.

Before we leave the subject of connecting rods and bearings, it may be interesting to review some of the tooling developments that were in part responsible for the now "taken for granted" fact that you can drive your car the entire season without worrying about the next bearing "take up" time.

Ten years ago, babbited bearing connecting rods were more or less in universal use. Finishing of the large hole, after babbiting was accomplished with a reamer, varying in design from a multiple bladed expansion reamer to a single blade reamer, the part generally fed through the tool by hand. As the later introduced indicating type measuring instruments not available at the time, the roundness and ac-

curacy of these bores were not very good. When assembled in engines and run a few thousand miles, the high spots on the babbit wore quickly off, causing excessive clearance and bearing knocks. To correct this trouble the car was taken to the garage, connecting rod caps removed, several shims removed, and caps reassembled. The garage mechanic, in order to give you a quiet running engine, would set these bearings for a metal to metal fit, tow the car around the block three or four times and then deliver the car to you with the engine running and with the warning that you must again drive at a speed not to exceed 25 miles per hour for the next 500 miles or pay the penalty of burned out bearings. After the 500 miles, the high spots would again wear off and before long you would repeat the operation.

Some companies took off the first high spots themselves before you bought the car, by running the engines with the bearings set up metal to metal, until they started to smoke, and then quickly stopped the motor just before the babbit melted.

Accurate gauging methods soon pointed out the trouble and demands were made for more accurate machining. The precision boring machine, using a diamond tool, replaced the reamer and everything was rosy for a while.

The automotive engineer, however, always ready to take advantage of new developments, increased the speed of his engine until even the diamond bored babbit bearing couldn't take it. New bearing material had to be developed which did not readily lend itself to either the die cast or the centrifugal method of molding into the rod. These new bearings had to be made as separate shells and clamped into the large bore of the connecting rod. This meant that the steel rod must first be bored to very accurate tolerances to avoid any buckling of the thin bearing shell when they were inserted in the connecting rod. The engineers figured that the bores must not vary over .0005 in order to avoid selective assembly.

At that time it was generally considered that boring steel to such tolerances was impractical and many motor builders installed grinders for the final sizing operation in the rods. However, some of the manufacturers experimented with first high speed steel, then later "Stellite" and finally the cemented carbide tools in the same precision boring machines that had formerly been used on the babbit. During these tests it was discovered that rigidity of spindle and holding fixture had much to do with tool life and as a result a new design precision boring spindle was developed and tried out. Today most connecting rods are finish machined by this method.

Before leaving the subject of engine bearings it is interesting to note that the harder bearing metals developed have been so successful that now the crankshaft journals can't take it. A higher degree of hardness is demanded and several new processes of obtaining this are already in use. Local or surface hardening of all bearings on the crankshaft to a hardness of from 58 to 60 Rockwell C scale, is obtained without the necessity of heating the entire forging. As the final finishing is by grinding, this new development should have little bearing on the grinders formerly used, but because no previous heat treatment is necessary on forging before machining, it will no doubt affect design of tools and surface speeds and feeds of other operations.

In addition to the subjects touched upon in this paper, no list of machine tool builders' outstanding contributions to the automotive industry would be complete without including the Modern Way Drillers and Tappers that drill or tap all the holes on five sides of a cylinder block in one operation—Surface broaching machines using broaches up to 8" in length, that finish the top of cylinder blocks from the rough casting in one pass—Welding machines that weld steel water jackets on cast iron cylinder blocks that are water tight—Hydraulic special machines, electrically controlled, that perform various operations automatically so that they appear human—plus many more developments too numerous to mention in this paper.

The true facts behind the scenes of these improvements seldom are made public, but they would be as worthy of recognition as the thrilling stories re-enacted daily over the radio and probably would be just as interesting.

Fundamentally, most machine processes are based on the same principles as in the days before the automotive industry came into prominence. However, the automotive industry could never have developed to its present immensity if machine tool builders had not developed machines capable of finishing parts within thousandths of an inch at production rates that run up to hundreds of pieces per hour. In the old days the finishing of a piece to such accuracy was the work of the tool room. Therefore, it would seem that the greatest contribution of the machine tool industry to the automotive industry, has been the provision of high production machines producing tool room accuracy.

Detroit Chapter Golf Tournament

July 24th, 1937

RAMMLER GOLF CLUB

Just North of Schroenherr Rd. on Utica Rd.

$2.00

Including Golf and Dinner

This is Detroit Chapter's annual golf tournament and outing—an all-day affair packed with fun. Among the continuous round of activities scheduled for the occasion are: a kickers' handicap, low gross prizes, a driving contest, separate prize lists for members as well as guests, and many other special events to be announced later. The fee of $2.00 includes golf as well as a dinner to be served at 5 p.m. Various friends have offered and many have already contributed handsome prizes.

Notices will be mailed soon. A program will also be mailed, as soon as all prize lists etc., are completed.

PLAYERS ARE URGED TO TEE OFF AS EARLY IN THE MORNING AS POSSIBLE TO AVOID THE USUAL SATURDAY MORNING RUSH.

BROACHING—When, How and Why

Part I—Evolution of Modern Broaching

The accompanying article by Mr. Hart represents the first installment of a synopsis of a talk on broaching given at the Milwaukee Chapter meeting of the A.S.T.E., June 10th. Next month's installment will deal with the proper selection of broaching equipment for the job in question, what type and size of machine, etc., is best suited to different classes of work, and why.

By

W. A. HART

Member A.S.T.E.

Chief Engineer, Colonial Broach Company

BROACHING, the most modern of production arts and sciences, is not in itself a spontaneous invention. So obscure is the early history of broaching in its evolutionary stages that it is virtually impossible to find out who made and used the first "broach."

More than a hundred years ago locksmiths in France used what might almost be termed "broaches" in sizing and shaping square holes. To do this they used a series of square drifts and punches to cut the hole. After filing the edges they used another, larger single-cutting-edge punch, filed again, a still larger cutter, etc. until finally the hole was properly sized. (Fig. 1a.)

Later, with the evolution of machinery we find in use a hand-made broach (Fig. 1b)—hardened, even if it wasn't ground as are modern broaches. It was used on a simple hand operated device for cutting a keyway. Gradually other shapes (Fig. 1b) began to be cut in a similar manner.

Somewhere or other around this time broaches came into being as distinctly characteristic tools which might be defined as "a bar of steel with a number of stepped teeth to rough cut at one end, with a group of teeth all of the same height at the other end for finishing, and a few intermediate teeth, with only slight steps, in between for semi-finishing."

As more was learned about the art and science of cutting materials, certain characteristics established themselves definitely as under-lying the broach design for any given job. For the roughing teeth, pitch (see Fig. 2) was found to depend on length of the work to be cut. Back-off angle depended largely on the materials to be cut. Depth of the tooth, together with pitch were controlled by the space which had to be allowed for chip clearance in order to obtain free cutting action. The radius at the bottom of the tooth, it was found had to be made smooth so that chips could curl up properly. Further, it was found that in sharpening broaches after use, care had to be taken to make sure of a smooth radius here. The hook or face angle was another important specification depending on the material to be cut and might be anywhere from a negative value to 15 degrees, according to the job the broach had to do.

For the finishing teeth the same set of characteristics were found to hold. But, in addition, to get long life of the broach the finishing teeth had to be provided with a land on top to furnish the proper support and to allow for grinding. Normally also it was found that pitch could be much smaller for the finishing than for the roughing teeth. Today such teeth are found in keyway broaches, round broaches, push and pull types, serration broaches, surface broaches, and the broaches which we already commonly encounter throughout industry cutting all types and sizes of forms.

Sometimes such broach forms are combined in a single tool. A simple example is a combination hole and keyway broach which first sizes the hole, and then cuts the keyway—all in one stroke. At the end of the broach there may be a removable shell which also burrs the hole.

Modern Broaching

Broaches as we know them in widespread use nowadays however, probably received their major impetus from the development about 1918 by Colonial Broach Company of ground high speed steel broaches. The tremendous savings in production costs, rapidity of production and simplicity of operation which were the combined results of these new tools were not long in creating a demand for fixtures and machinery which would enable industry to take full advantage of the wider opportunities this development entailed.

Fixtures in the early days were

Fig. 1a. "Broaching"—one hundred years ago.

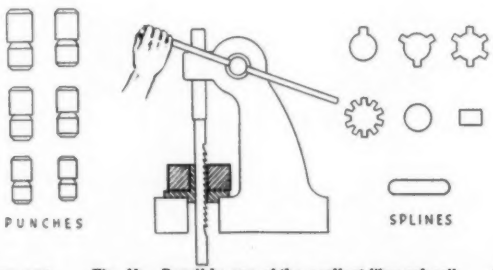


Fig. 1b. Possibly one of the earliest "broaches" and some shapes for which such tools were used.

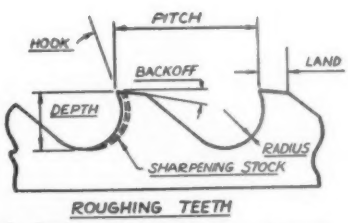


Fig. 2. Fundamental specifications of broach teeth cover these factors

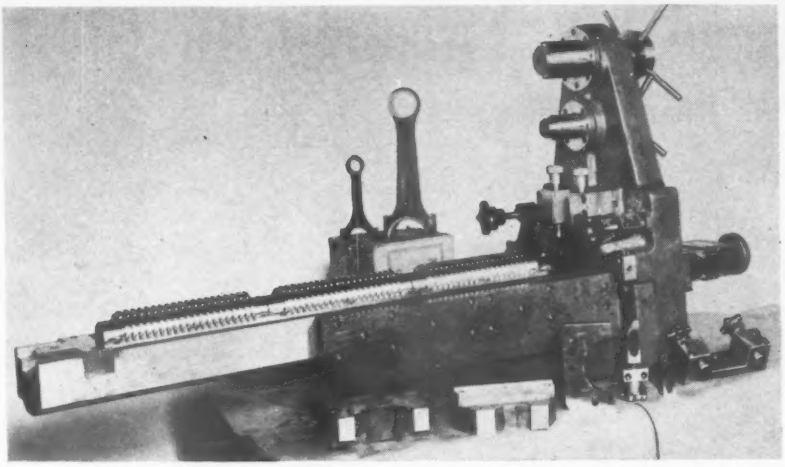


Fig. 3. Broaches and fixture for several sizes of Diesel connecting-rods.

crude items. Today they are the nerve centers of every piece of broaching equipment. After all, any broaching machine is mainly a machine designed to handle a broach. Without proper fixtures for work locating, work handling, etc. maximum effectiveness of broaches and machinery cannot be obtained.

An example might be noted in Fig. 3, showing broaches and fixtures for machining half-rounds and joint faces of diesel-engine connecting rods. The problem was to broach such surfaces on several sizes (center distances) of rods. In the design of the fixture this was taken into consideration so that each length of rod was properly located as to squareness in all directions, and distance from the pin holes. With the correct broach, and correct fixture, all the machine had to do was to move the broach correctly for uniformly satisfactory results.

Scientific fixture design has in the last year or two helped in making possible the development of standardized machinery—vastly reducing broaching costs—by enabling certain basic types of machines to be converted from one sort of job to another by the adaptation of proper fixtures.

The development of really modern broaching machinery lagged considerably behind broach and fixture development. Early machines were, of course, crude. The requirements of broaching were not fully understood. Hydraulic operating mechanisms had not as yet been developed. Every machine virtually, was a special machine designed for that job and that job only. Only in the highest-production industries was it possible to carry such a capital expense profitably, since changes in design of the product would frequently obsolete the machine completely before it had been amortized.

Standard Machines—Now

Today that is no longer true. Standard machinery is available at reasonable cost to do about 90 percent of all broaching jobs. Such machinery is built up out of welded steel—in sections for further standardization and lower costs. They are designed so that they can be readily converted from one job to another and from one type of operation to another. Even different tonnage requirements for the new job do not necessarily obsolete the machine, since usually the necessary modifications can be readily made. The same applies, in a way, to length of stroke. With standardization the cost of machines has come down to such an extent and demand has grown to such proportions that the manufacturer can virtually pick the exact standard machine he needs out of a catalog—specifying tonnage and stroke, cutting speed and return speed, etc.—always assuming, of course, that he has available the necessary fundamental information on broaching to determine just exactly WHAT he does need and why.

Modern broaching machinery, being flexible, is designed for long life. Hardened and ground ways are considered essentials today. Operation is hydraulic. Drive is through direct coupled motors and pumps built into the machine. Coolant pumps are today several times the size they were a few years ago. Exteriors are attractive and modern —clean and easy to keep clean. Chip removal is no problem with the better broaching machinery available today.

Surface broaching with its tremendous opportunities has contributed another factor as it has become more widespread—adequate faceplate capacity to permit the secure mounting and support of the largest fixtures needed, frequently neglected in earlier day equipment.

"Standard" attachments are available today for standard machinery. Modern broaching machines are designed to take such accessories whether they are needed at the moment or not. Included are such items perhaps as spiral broach bars for rotating the broach while cutting (see Fig. 4)—follow rests for long broaches, etc.

Special machinery is, of course, still needed at times as for jobs where unusually high production requirements make it desirable to spend a little more for the special machine in order to lower the cost-per-piece in routine production.

But. on the whole, broaching, broaches, and broaching equipment have today come into their own as definitely established modern tools of industry. Two decades of broaching have provided broach manufacturers with a tremendous fund of basic information. Today it is difficult to find any really "new" broaching job. Almost every one is an adaptation or variation of an analogous job which has been done before somewhere, sometime, by somebody.

Even the use of tungsten carbide which has come into prominence so much of recent years has not been neglected by the broach manufacturers. Tungsten carbide tipped broaches have long been on the market and have been finding a fair degree of success in the broaching of cast iron. Particularly promising is this material for the future in the broaching of very large surfaces.

(To be continued in an early issue)

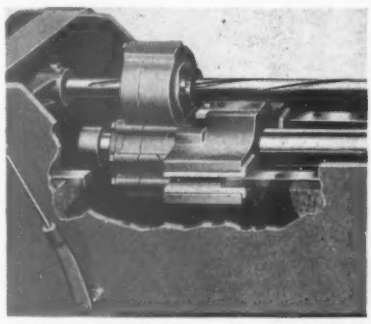


Fig. 4. Spiral broach driving bars are available as "accessories" today.

Routing the Large Job Through the Shop

The Piece Work System

By

Harold Heywood

Kearny and Trecker,
Milwaukee, Wisc.

As given before
Milwaukee Chapter A.S.T.E.
May 13, 1937

Editor's Note: Gideon Kane, A.S.T.Eer of Milwaukee Chapter and the Northwest Engineering Company of Green Bay, asked for a discussion of "Production Scheduling and routing as applied in the manufacture of heavy machinery,—and just how this part of a system ties in with the final rate setting, purchases and stores." A large order—but here is an excellent paper in answer to the request

IN the absence of an experienced authority as requested by Mr. Kane, I will do my best to present a general word picture applying to the production manufacture of machinery ranging from 2,500 lbs. to around 35,000 lbs. in modern equipped, medium size manufacturing plant.

Mr. Kane stated that "this may seem like a large order" and it surely is a large order in view of the volumes that have been written and printed under each one of the four or five separate headings, as follows:

1—Production Scheduling
2—Routing
3—Rate Setting
4—Purchases
5—Stores

This actually means "Industrial Management." Articles under "Purchases" and "Stores," as covered by the last two headings, are usually combined because of their very close alliance to each other.

Inasmuch as an entire evening could be spent in presenting any one phase of control and manufacturing analysis, we can only briefly touch each subject during this allotted half hour, and make a rather general summary:

Production Scheduling

The starting point is to base anticipated requirements on yearly sales of past years. However, the market trends have an influence which calls for rather shrewd interpretations by the sales force and the management.

Once the anticipated requirements are established, they must be reduced to cycle requirements. This cycle requirement is based on the time required to build an economical lot, contingent upon the available machines in the plant.

This lot, again, may require too much inventory, therefore, the lot must be made into "inventory lots." Here we must take into consideration the class of shop machines available such as Planers to be scheduled for small lots of relatively heavy parts, or automatics scheduled for large lots on small parts.

It therefore follows that it will be necessary to order more frequently the major parts than for minor parts.

Now, the economical quantity is the determining factor for the size of economical lots, for any particular shop machine. However, after a complete study has been made and determined for each class of shop machines, then must be resolved the largest lot of parts necessary to produce the finished product so as to insure a steady movement of the erecting and shipping floors. This, in brief, is a simple outline of the Method of Scheduling for Production Manufacture.

Planning or Production Scheduling

This is nothing more or less than a control board having as its main function the keeping of records to show the back-log of any given department at any given time. This statement may not at once seem apparent, yet these very records are used to furnish purchase requisitions and information on stores, besides furnishing departmental and actual machine loads.

Routing

This department routes material, operation by operation, done in the various departments. A routing sheet should be issued and accompany each job with the following information, for example, a simple part such as a bronze bushing:

A sample routing sheet should show the Part Name, Part Number, Type of Apparatus used on, Order Number, Raw Material, Quantity in lot, Date of Drawing or last change, and then in the columns provided the various operations on the piece in their sequence, with the department numbers involved, a column for the pieces completed in the various operations and the time required for the lot on each operation.

On this operation sheet it is also good practice to give the tool data for each operation along with set-up allowance time, operation allowance time per piece, data material is required to be finished, etc. A master form is to be kept for office record to be used in making up rates and time vouchers as well as for duplication record for future lots.

A follow-up card should be made and kept in an "open order" file; that is, work in process, until the job has been closed, when this card with complete time and pieces completed properly recorded should be sent to the Cost Department.

A material Requisition card should be made and issued to obtain raw material which is then charged to work in progress.

A Receipt of Order card should also be made and issued to the Cost Department to show that an order has been placed in the shop after which it can be used to check or used as a credit record.

The above cards can be easily made from, and at the same time, that the operation sheet is made up.

A Tool Card should be made up by the Rate-setting and Routing departments for all operations performed in the Machine Shop. One copy should be kept as a permanent record in the Rate-setting and Routing department. A second copy should permanently be held on file at the tool cribs and a third copy for the department number interested with the operations, so that machine operators and the utility service men can obtain the tools for use on the required shop machines.

A Time Ticket should be issued on each lot giving hours allowed for each operation. These "hours recorded" may be added to show the shop load, department by department. One copy should be issued for the Cost Department for recording. It should go along with the work and be "clocked in and out" after which it is returned to the Cost Department to await the Inspection Department's report showing num-

ber of pieces good or rejected. The information then obtained is to be sent to the Pay Roll Dept. to figure the operator's pay. It should then be sent back to the Cost Department for the job cost records, and another copy goes to the Planning Department for deduction of shop load.

Another copy of the Time Ticket should be issued to the machine shop department performing the operation and held there until material has arrived. Then the card should be placed with the material, awaiting allocation of the particular job to the machine operator by the departmental foreman in charge. This card must be taken by the operator and checked with time recording department for the particular operation and clocked in and out. When the operation is finished, this time ticket is placed with the work and sent to the Inspection Dept. where pieces passed or rejected are entered and the ticket sent back to the Time Recording Department to release the duplicate first ticket to the Cost Department for their records as before stated.

A third copy of this time ticket should go along with the work until the job is inspected. After this has been done, the Inspection Dept. should record the number of pieces passed or rejected and this time ticket sent to the Production Scheduling Department "Job Record" file to show that this much of the job has been completed.

The foregoing may seem to be a rather complicated set up, but in reality it can be quite simple, as the forms required are small and printed in groups that require very simple entries. They are picked up in groups at specified times and returned to the Cost or Production departments.

The Inspection Department

At this point it is not entirely out of order to mention the importance of the Inspection Dept. Besides controlling the quality of the product it has been indicated their importance in keeping the count of the work passed and rejected, and entered on the proper forms as before described. The set-up of this department should be entirely separated from the shop supervisory end, and the Chief Inspector answerable only to the Shop management. This set up allows of a proper check on all incoming new materials, work in process, and the finished product on the shipping floor. Here is another sort of control which vitally ties in with the whole system.

It is a good practice to have all requests for drawing changes to facilitate manufacture sent thru the office of the Chief Inspector, who should be always in touch with every phase of shop operations, tools, equipment and programs. Records of breakage or complaints from the product sold to the market should be furnished the Chief Inspector and it should be his duty to examine and report on any parts of the product returned for repairs to the shop supervisory department and to the management. Inspection cribs should be set up in the small parts manufacturing departments and furnished with all necessary equipment to prevent loss of time in borrowing equipment such as gauges, jacks and parallels, etc. Here parts should be checked, operation by operation, and each inspector have an individual punch for the time tickets, and make entries of each inspection on the daily inspection report form.

A copy of this report is turned over to the Cost Dept. each day to be used as a check on the released time tickets coming in to the department.

Where work is too large to be sent to the Inspection Crib, an inspector should be permanently located in that department. He should use an individual stamp to mark the work inspected and make proper entries on his daily inspection report form. Any operation not being properly performed should be immediately stopped by the inspector and reported at once to the foreman in charge of that department. By this control, the amount of defective parts may be reduced, thus tending to reduce the ultimate costs.

An Inspector must be in charge of all incoming materials, such as bar stock and castings. He should have reports on metal analysis from the shop laboratory and be always in direct connection with the foundries or sources supplying raw materials. Layout men and checkers with the necessary equipment should be under this inspector's supervision, all of whom should, of course, be responsible only to the Chief Inspector.

Where machine shop work is defective, a report should be made out by the inspector and the signatures of the foremen in charge should be obtained. This procedure has manifold reasons and results. The foreman officially goes on record as acknowledging the work spoiled in his department. The blame is quite sure then to be put in the correct place and surely the foreman and the workman will devise some means so that it does not happen again. This is especially true as spoiled work is always deductable from the workman's bonus, where a work incentive plan is used.

Rate Setting

There are two methods which may be used—first, that determined from time studies of the operator and machines, tools and work involved; Second, is setting rates from predetermined standards which have previously been obtained and analyzed to suit the average operator when working on any particular shop machine for which the standards represent.

There are many plans of incentives which could be adopted to suit the type of apparatus manufactured. On straight piece work, a workman is paid for all he makes. This system has to be very accurately rated and the incentive naturally can not be very liberal. With the premium bonus plans, where the workman shares the time saved, the incentive loading can be more liberal because part of the time saved can be regained. There are various incentives paid to the workman, such as the 50-50, 25-75, 33-66, and so on. For example—on a 50-50 basis, the workman will be in bonus sooner than on straight piece work, as I will show. If a man on straight piece work makes 25% bonus for 8 hours work, the allowed hours must naturally be 10 hours. On the 50-50 plan for the same 8 hours work to make 25%, the allowed time would be 12 hours, which means that an operator is earning bonus with the 50-50 plan two hours earlier than on straight piece work, giving the same results in actual work completed, for the management and the employee.

The economic set-up of the product and the shop concerned is the determining factor for the choice of the incentive plan, be it 50-50, 25-75, or any other.

Incentives

The idea of incentives is not to force the operator to work at a very high speed, but at a steady constant speed so that the Planning Department can schedule work to keep the shop in continuous operation without excessive inventory, which also helps the raw material order department for even orders so that raw materials can be purchased at even intervals rather than in a haphazard

(Continued on Page 30)

PRODUCTION PERSPECTIVES

News of Mass Manufacturing from Everywhere

Soaring payroll totals, announcement of more wage increases and vacations with pay, and increased labor union activity characterized the industrial panorama of the last thirty days.

Mid-West

Ambrose Swasey, Cleveland scientist and inventor and **Chairman** of the Board of the **Warner and Swasey Company, died June 15th** at his home in Exeter, New Hampshire, of pneumonia after a month's illness. He was ninety. International renown came to Mr. Swasey as the result of achievements in two distinct fields. He was famed for building some of the world's largest and finest astronomical instruments and for designing accurate and efficient machine tools.

Nash automobile plants **in Kenosha,** Racine **and Milwaukee** have **scheduled a two million dollar expansion** program to keep pace with mounting sales. The **Chrysler** Corporation has **acquired** a **part** of the **old Haynes automobile plant at Kokomo,** Indiana, and plans to start immediately to construct a division of Dodge, which **when completed will** have **cost around $2,500,000** and **will employ 1,000 workers.** From **Cincinnati, Ohio,** we learn that in the fight between the A. F. of L. and the C. I. O. for control of workers in the electrical manufacturing industry, the **A.F. of L.** has **won a prize plum there,** in **signing a closed shop** agreement **with** the **Crosley** Radio Corporation **covering its 2900 production workers.** A five to eight cent hourly wage increase was affected by the International Brotherhood of Electrical Workers, affiliated with the A. F. of L.

J. P. Lannen, A.S.T.E. Director, formerly with Graham Paige Motors Corporation is **now with Hupmobile** in the capacity of **Master Mechanic.**

East

A week's vacation with pay for all employes of a year's service or more has been announced by the **Wallingford Steel Company,** Wallingford, Conn., and **Wallace Barnes Company,** Bristol, while the **William L. Gilbert Clock Corporation** will give two weeks with pay to five year workers and one week for those with from one to five year service, **as well as a general upward revision of wage scales . . . Bonuses** have been **announced by Bridgeport Brass** Company, Bridgeport, **and New Britain Machine** Company, New Britain . . . **Workers at** the **Yale and Towne** Manufacturing plant in Stamford **have voted for the Yale and Towne Employes' Association as their bargaining agent** by a small margin over the United Electrical & Radio Workers of America, C. I. O. affiliate, while **Hendey Machine Company, Torrington,** has granted a form of recognition to the United Automobile Workers . . . **New Britain Machine** Company, New Britain now employing 1160, **has orders on hand which assure continuous operation throughout the summer . . . Segal Lock** and Hardware Company, Inc., Norwalk, **have** a **backlog** of orders on the books **showing a gain of 23 per cent over a year ago** . . . The **automobile type of assembly line** is being **used in** the new home **laundry equipment plant of General Electric Company,** Bridgeport, recently set up in the Remington Arms buildings acquired last winter with 1,000 foot conveyors.

An **upward trend of employment in Western Massachusetts** metal working industries was maintained last month, when 151 were added to the ranks of establishments reporting to the Springfield Branch of the National Metal Trades Association. **A. R. Tulloch,** secretary of the Western Massachusetts branch of the association, **explained** that with the exception of one concern they had added 200 to its payroll, **all firms went along with their working forces practically unchanged. Agreement** has been **reached by** the management of the **Van Norman Machine Tool Company** of Springfield, Mass., **and the C.I.O. local** regarding the grievance of the employes **against the "standard time" system** at the plant. **Fiberloid Corporation** of Springfield, Mass., **has again increased hourly wage** scales **10 per cent** benefiting some 900 employes. **The L. S. Starrett Tool Company of Athol, Mass., has voted to give a bonus to all employes payable July 1st,** based on the length of service with the company. Foundations are in progress for the erection of **an addition to the machine shop** at Worcester, Mass., **for Rice, Barton & Fales.** Notices have been posted at the plant of the **Millers Falls Company,** Millers Falls, Mass., **announcing** that the **plant** would be **closed from August 7th to August 16th** when all employes will be on a vacation with pay. **The Amoskeag Machine Company** of Manchester, New Hampshire, **has been organized** by a group of former Amoskeag Manufacturing Company executives and **has purchased two buildings** for a total area of 118,864 square feet, from Amoskeag Industries, Inc. **Alfred H. Vose** is president and general manager.

West

The **Columbia Steel Company,** Los Angeles, which is a subsidiary of United States Steel and has large steel plants at Pittsburg, near San Francisco, and at Torrance, near Los Angeles, recently **awarded** a **contract** to the **Lewis Foundry and Machine Company** for a completely mechanized **three-high mill with roller and catcher tables.** The third wage increase this year for employes of the **"Hotpoint" plant of the General Electric Company at Ontario, California,** was announced recently by **W. H. Tangeman, superintendent. The Lockheed Aircraft Corporation** have just **completed** a six month's **expansion program at** its **Burbank,** California plant **at a cost of** nearly **$1,000,000,** and has just moved into its new office and administration building. The enlarged plant, **with 1600 employes,** and improved facilities will enable Lockheed to go into **production of ten planes** a month and when, **in July,** the new type high-speed air liner is introduced, it **is expected** that **production will be** stepped up to about **fourteen deliveries of the huge aircraft every four weeks . . . Thompson Products, Inc.,** of Cleveland, has entered the California field by **taking over the Jadson Motor Products Company at Bell,** in suburban Los Angeles, one of the nation's oldest manufacturers of engine valves. **The General Controls Company,** manufacturer of automatic temperature, pressure and flow controls for gas, oil, refrigeration and air conditioning, have **started construction of the first unit** of its **new**

(Continued on Page 42)

A. S. T. E. CHAPTER NEWS

BRIDGEPORT

E. H. Ebelhare, Chapter Publicity Chairman, 323 Trumbull Ave., Nichols, Conn.

The June meeting of the Bridgeport Chapter of the A.S.T.E. was held at 8:00 P.M. at the Bridgeport Brass Company's Clubhouse and sponsored by the Foreman's Club of the Bridgeport Brass Company.

Chairman John Bullard opened the meeting and introduced the guest speaker of the evening, Mr. A. W. Green, Director of Physical Laboratory of the Ludlum Steel Company. Mr. Green's topic, "Saga of Fine Tool Steels," was illustrated with a technicolor movie which showed the method of producing tool steels at the various Ludlum plants. Mr. Green gave a very interesting talk, one that will long be remembered by those present. He discussed the four divisions of tool steels—Hi-speed Steels, Hot Die Steels, Shock Resisting Steels and the Die Steel group.

Following Mr. Green's talk, a general discussion was held on "Developments of Dies." This discussion was led by Ernie Morris of the Bridgeport Brass and C. A. Dundore of the Underwood - Elliott - Fisher Company. Mr. Morris displayed draw dies and discussed the design of these tools as used by the Bridgeport Brass Company. Mr. Dundore illustrated new types of piercing and blanking dies as used by the Underwood-Elliott-Fisher Company.

Mr. Ben Page, Chairman of Program Committee, then outlined the proposals he had secured for an outing. After a lengthy discussion it was decided to have a shore dinner in September.

This meeting ended the monthly meetings of the Bridgeport Chapter for the present, until the first fall meeting to be held September 9, 1937. After the business meeting adjourned at 10:00 P.M. a light lunch and refreshments were served.

BUFFALO

Benjamin C. Buerk, Secretary 315 Grote Street, Buffalo, N.Y.

The regular June meeting of the Buffalo Chapter of the American Society of Tool Engineers was held June 11th at the Buffalo Trap & Field Club. Dinner was served at 7:00 P.M. to fifty members and friends.

After the dinner, Chairman J. Don Reep, introduced Mr. S. H. Brandenburg of the Monarch Machine Tool Company who came to Buffalo through the courtesy of Mr. George Brunton, local representative of that company. Mr. Brandenburg then showed us a very interesting and instructive motion picture depicting the development and progress of the modern engine lathe and the construction and operation of standard and special Monarch lathes, including the Monarch Centrode Device, the Magna-Matic Automatic Lathe, the Monarch-Keller Form Turning and Boring Lathe and the Monarch Special Manufacturing and Semi-Automatic Lathes. Approximately seventy members and friends witnessed this picture and heard Mr. Brandenburg's lecture.

A rising vote of thanks was given to Mr. Brandenburg and the meeting was adjourned at about 10:00 P.M.

CHICAGO

Raymond Weeks, Chapter Publicity Chairman, 818 Junior Terrace, Chicago

The Chicago June meeting was held at the Machinery Club on Monday, June 14th, preceded by a dinner. The meeting was opened by Mr. Frank Creager, Chairman. There was some discussion relative to summer meetings and an outing for the Chapter.

The principal speaker of the evening was Mr. Weeks, of the Vanadium Alloys Steel Company, who had a very interesting group of lantern slides showing the application of carbides to various types of bits, showing the wear and breakdown of these carbides when improperly used. These slides also illustrated the proper application and use. Mr. Weeks had a very interesting accumulation of data relative to the proper rake and clearance and the application of the rate angle and the direction of the angle for this type of cutting. Another very interesting group of slides showing applications of the carbides, both tungsten and tantalum and giving the feeds and production rates. These slides showed applications for various types of manufacturing. They were very well received.

Ford R. Lamb, Executive-Secretary, A.S.T.E., was also present and gave a talk on the Society, its accomplishments and something of its future. He particularly called attention to the development of the nation depending more on Tool Engineers and Tool Engineering than on any other engineering group.

CLEVELAND

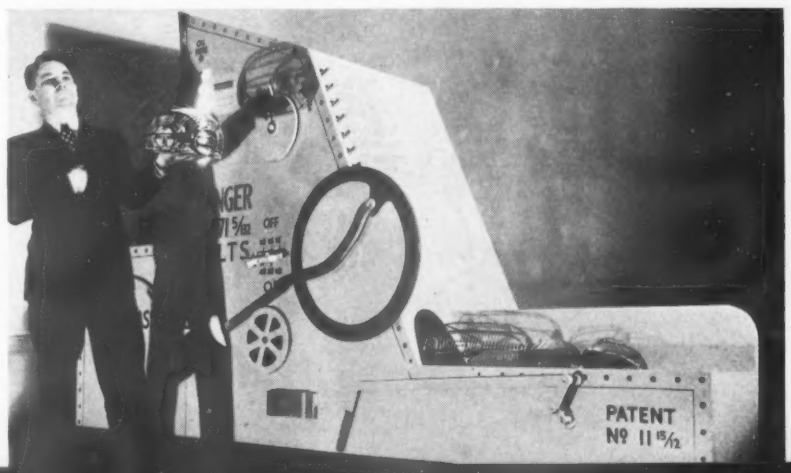
R. P. Oswell, Chapter Publicity Chairman, 1595 Hawthorne Road, Cleveland

Cleveland Chapter's June meeting was held Tuesday evening, June 15th, at the Colonial Hotel. Mr. Paul F. Zerkle, Chapter Chairman called the meeting to order at 7:45 P.M. A report from the Treasurer, Mr. A. R. Black, revealed that a profit of about $225.00 had been made on the Chapter's Tango Party which was held on May 22nd. A vote was taken among the members and it was almost unanimously agreed that the meeting date be changed to the second Tuesday of each month.

It was also decided to hold the next meeting of Cleveland Chapter in September at the plant of the National Acme Company. A dinner will be provided to the members through the facilities of the company cafeteria and will be followed by a

(Continued on Page 22)

Shown below is A.S.T.E.er R. S. Elberty of Pittsburgh Chapter and Westinghouse Electric & Manufacturing Company. He is the inventor of the "Marvelous Manufacturing Machine" which so highly entertained Pittsburgh A.S.T.E.ers some time ago. The machine or "ridiculous device" was built entirely to Mr. Elberty's specifications, complete with rat traps, connecting rods, tin cans and fireworks. It sets a new high in the mass production of laughs and thrills.



THIS MONTH'S COVER

A NEW gear-lapping machine, providing greater flexibility and reduced lapping costs is illustrated on this month's front cover. Just announced by Michigan Tool Company the machine represents an interesting addition to the Michigan line of gear production equipment.

A particularly valuable feature of the machine is the unusual amount of flexibility incorporated in the design, permitting the rapid lapping of different lots of gears without wastage of time in change-over.

It will lap gears from 1½ to 20 inches in diameter; clusters up to 30 in length (two gears lapped at a time if desired). Change over time for different diameter gears of the same pitch and helix angle is only about 5 minutes. Not more than 20 minutes is needed for a complete change over including changing of laps.

The machine, it will be noted, has two laps which may be used either for lapping front and back side of gear teeth at the same time, with the machine running in one direction only, or may be set to lap two separate gears—as on a cluster, simultaneously.

This duplex type of operation makes possible a reduction in lapping cost up to 50 percent, cutting handling time in half and increasing production rate proportionately. Thus in addition to being designed ideally for shorter runs of a variety of gears it is also highly efficient as a mass-production machine.

The machine comes equipped with an automatic cycle control mechanism adjustable to permit setting the lapping cycle at anything from five seconds to 20 minutes in both directions, the machine running first in one direction, then reversing, running the same length of time in the other direction and then stopping for re-loading.

It will be noted from the illustrations that the two laps are located at either side of the work. The lap at the back of the machine is the driving member, being driven through a three horsepower 1140 rpm: motor. The work is mounted either between centers or on an arbor. The centers are mounted on a reciprocating table the stroke of which can be set to anything up to 5 in. The table is driven through a second 3 hp. 1140 rpm. motor.

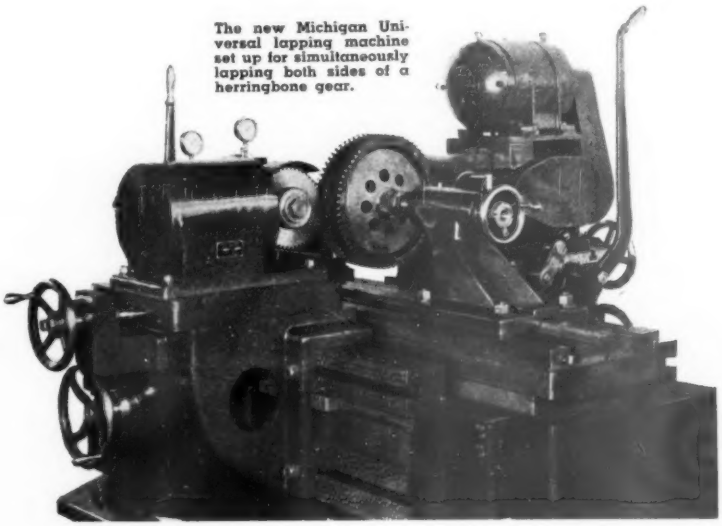
The work itself drives the second lap at the front of the machine, which lap in turn is provided with an adjustable hydraulic brake for establishing the correct lapping pressure between laps and gear teeth.

The mounting of the laps is such that they may be set at varying angles to the axis of the gear being lapped (crossed-axes lapping). Further, both lapping heads are mounted on slides so that they may be moved to any position desired. Lapping two gears of different diameters simultaneously is thus made possible in a simple manner.

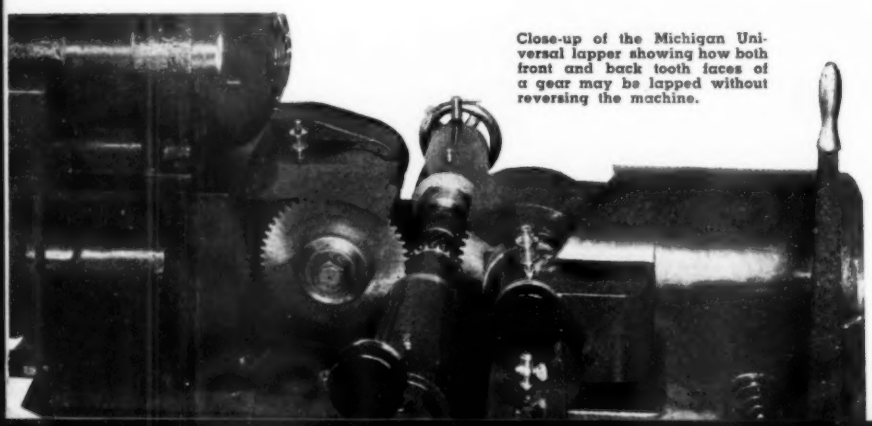
Primary adjustment for position of the laps is through hand wheel and screws. For unloading and after reloading a hand lever throws the front lap out of engagement and returns it into proper position, the lap head being brought up against stops for accurate re-locating.

Thus the driving lap is left at proper center distance, facilitating re-loading since the driving lap and gear to be lapped will be correctly meshed during loading. The front lap then will come back into mesh with the new gear exactly as it was taken out of mesh with the gear just removed.

The machine is equipped with suitable pick-off change gears to obtain any lap speed or table reciprocating speed that may be required.



The new Michigan Universal lapping machine set up for simultaneously lapping both sides of a herringbone gear.



Close-up of the Michigan Universal lapper showing how both front and back tooth faces of a gear may be lapped without reversing the machine.

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Chapter News

(Continued from Page 19)

technical lecture on Automatic Screw Machines.

The guest speaker of the evening was Mr. David L. Cowles, who is the ballistics expert of the Cleveland Police Department. He spoke on the subject "Scientific Crime Detection in America." He stated that seven facts must be known before any crime can be solved. These are: (1) What was the crime? (2) Who did it? (3) When was it done? (4) Where was it done? (5) How was it done? (6) What was the motive? (7) Who shared the deed? The principles of science play an important part in the laboratory work. Through ballistics, chemistry, metallurgy, microscopy, moulage, and the ultra violet ray, the police have been able to solve many foolproof crimes. To prove this point Mr. Cowles provided the members with glimpses into interesting cases where branches of science were used in determining the guilty individual.

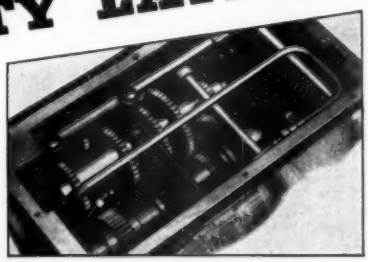
A question and answer discussion followed the lecture by Mr. Cowles. The question "If the guns are made on a production basis with the same type of tools, wouldn't the barrels be identical to one another?" raised considerable interest from the standpoint of Tool Engineers present. In answer to the question, Mr. Cowles stated that several tests have been made to determine if this were true, but because of the special attention given to the barrel of each gun in the lapping process, there are certain indentures made in each barrel and in no case have there been two barrels found to be exactly alike.

Cleveland Chapter will not meet during July and August. Meetings will be resumed starting September 14th. Watch August issue of THE TOOL ENGINEER for announcement of time, place and speaker.

LEBLOND

HEAVY DUTY LATHES

If you use lathes, and are interested in effecting operating economies, improving production schedules, enjoying trouble-free, dependable performance, investigate LeBlond Heavy Duty Lathes . . . outstanding in the machine tool industry as the greatest value for your production equipment dollar. Only LeBlond Lathes provide all the modern time-, labor- and money-saving advantages that enable you to overcome today's competitive conditions. Send for illustrated literature describing in detail LeBlond Heavy Duty Lathes in all sizes 12" to 36".



Headstock construction is rugged, simple, faultless in operation, quiet, smooth-running. Gears are hardened chromium nickel steel; teeth precision cut and ground. With gear train for twelve speed changes, reverse and compounding feed gears are *also* in head, eliminating troublesome hanging brackets and gears on end of lathe.

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DETROIT

R. M. Smith, Chapter Publicity Chairman
12775 Greenlawn Avenue, Detroit

Detroit Chapter will hold regular meetings during July and August. The next meeting will be held in connection with the yearly Golf Tournament, announced elsewhere in this issue, which is to be held July 24th at the Rammler Golf Club on Utica Road, north of Schoenherr Road.

All A.S.T.E.ers, whether from Detroit Chapter or not are urged to attend the golf tournament and enjoy the usual good times of this occasion. Members' guests are cordially invited to attend.

Further details will be given on the meeting notices so watch for them, then make reservations calling local office, Madison 7960 or call one of the ticket sellers.

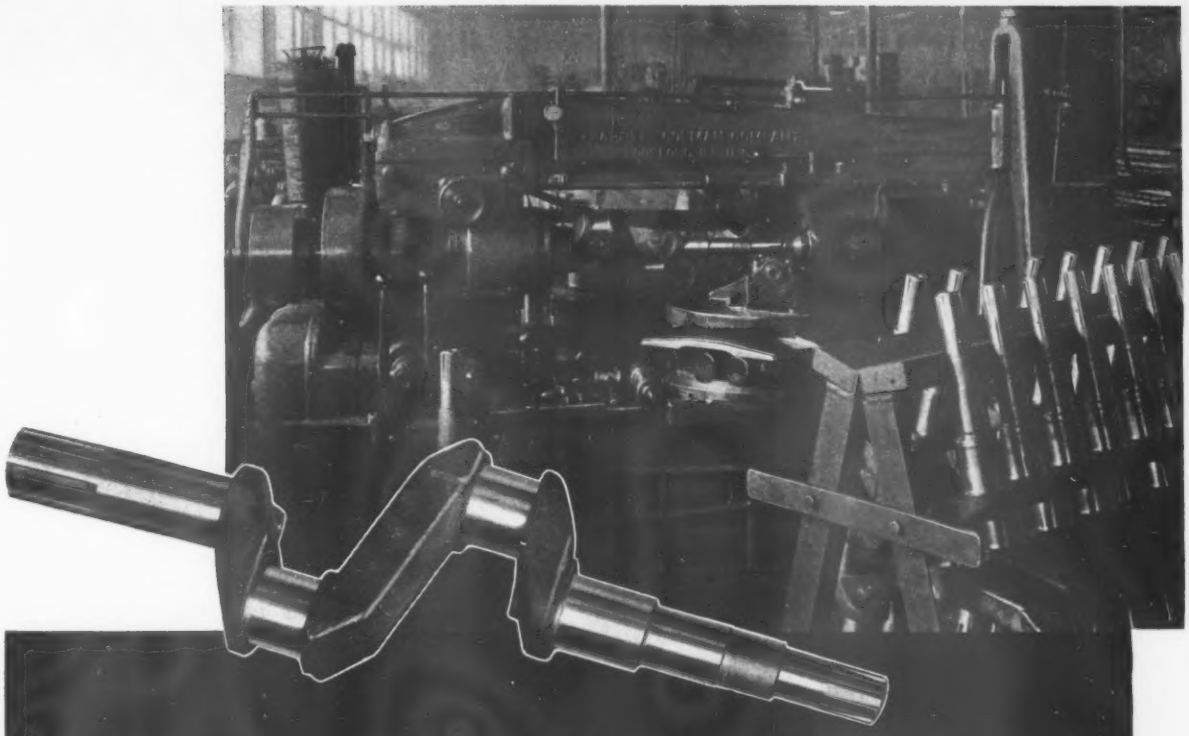
DETROIT CHAPTER MEETING NOTICE

All elected and appointed officers and committeemen are requested to attend an executive meeting on the third Thursday of each month at the offices of The Society—5928 Second Boulevard, Detroit. The purpose of this meeting, each month, will be to co-ordinate the activities of committees, and plan such new business as may come up from time to time. These meetings will start at 7:30 P.M. and end promptly at 9:00 P.M.—C. F. Staples, Chairman.

All members are invited to attend these meetings.

The regular June meeting of the Detroit Chapter was exceptionally well attended. A combination dinner and business meeting was held in the assembly room of the United States Rubber Company's plant in Detroit on Tuesday, June 1st. Approximately 275 members and

(Continued on Page 24)



Taper Splines Specified On Tractor Shafts

Illustrated is a Barber-Colman Type T Hobbing Machine which is hobbing taper splines in crankshafts, axle shafts, and brake shafts in a mid-western tractor plant. This machine happens to be used continuously on taper splines but it can also hob spur or helical gears, ratchets, straight splines, or other forms at any time as desired. The drawing for the crankshaft shown above indicates instantly the high standards of design and workmanship maintained in this plant. Close limits are specified on all important dimensions, and notes indicate nine rigid requirements which "must be" met.

The Barber-Colman Taper Spline is specified on this high class work because it is stronger than other methods for mounting machine members on shaft-ends, has greater contact area, does not weaken the shaft, provides a positive seat for the mating part; can be produced accurately, rapidly, and economically on the Barber-Colman Type T Hobbing Machine. These, and other advantages, are steadily increasing the number of different products in which Barber-Colman Taper Splines are specified . . . may prove equally effective in your products. Investigate. Write today for complete information about the taper spline and the Barber-Colman Type T Hobbing Machine.

Crankshaft shown above is S.A.E. 1045 steel averaging 255 Brinell. Has 6-key Taper Spline 2" long on 1¾" diameter. Barber-Colman Ground Hob used on Type T Hobbing Machine. Production data supplied on request.

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Chapter News

(Continued from Page 22)

guests attended the banquet and over 300 attended the business meeting and tour through the United States Rubber Company plant. The business session was addressed by Mr. Montague A. Clark, Engineer of Industrial Relations, for the U. S. Rubber Company, who spoke on the subject "From the Tree to the Tire."

Engineers provided by the company conducted successive groups of Tool Engineers and their friends through the plant explaining various steps entailed in the fabrication of the latex and materials into the completed tire. The latest methods and improvements in processing and compounding rubber and the building of tires, was of great interest to those who made the tour and heard the interesting address by Mr. Clark.

DETROIT STUDENT CHAPTER

Jack Grant, Publicity Chairman
Detroit College of Applied Science

Detroit Student Chapter meeting was held Thursday, June 17th at the Detroit College of Applied Science. Mr. Rylander, the principal speaker of the evening spoke on "The Value of a Liberal Education for Tool Engineers to Balance the Intensive Technical Training." He also voiced a plea for tolerance and understanding of existing conditions. Mr. Rylander's talk was followed by a very interesting discussion in which the students took part.

An informal discussion followed Mr. Rylander's talk on the subject "Should the Government Control Maximum Hours and Minimum Wages for Labor?" The July meeting will be held Thursday, the 15th at the Detroit College of Applied Science.

MILWAUKEE

Emmor E. Houston,
Chapter Publicity Chairman,
1029 South 35th St., Milwaukee, Wisconsin

The Milwaukee Chapter concluded a very successful season with the June meeting, which was very well attended, one hundred and forty-five members being present for the dinner and lectures. As it has been the custom to adjourn during the summer months we will maintain the same policy this year, resuming activity again in September.

Mr. John Tompak of Badger Tool & Die Corporation, presented a paper on "Cams as Clamping Devices." Mr. Tompak has done considerable tool research work, and his subject dealt with one of the most important phases of fixture designing.

A former national officer of the society, Mr. Hart, a representative of the Colonial Broach Co., discussed "Broaching and Broaching Problems," and the subject was of invaluable information to our members. (Part 1—Published in this issue.)

Chairman George A. Smart, introduced the principal speaker of the evening, Mr. Ford R. Lamb, National Executive-Secretary. Mr. Lamb gave a brief description of the early history of the society, some of its problems in the dark depression days when it was first organized. He explained that in 1932 the term "Tool Engineer" had had no general recognition, that the word "Tool" was subject to much argumentation and that at that time there was no society or organization having anything of particular interest to Tool Engineers. The need for an association with others engaged in the same line of work encouraged a group of Tool Engineers to foster the original A.S.T.E. Chapter in Detroit to give them representation and to promote the profession of Tool Engineering.

Mr. Lamb also pointed out that the society has been responsible for selling the Tool Engineer to industry and to the world. Tool Engineers, doing the important creative and essential work in the highly significant mass production industries should be known throughout the country and the world and the A.S.T.E. points the way to this recognition.

(Continued on Page 26)

How to Select and Heat Treat the Proper Steel *to Make Any Kind of Tool*

Here at last is a book for the man who makes tools—a plain, practical, common sense explanation of how to make tools that last longer. It will help you show your company how to get bigger production and how to bring down tool costs.

TOOL STEEL SIMPLIFIED

By FRANK R. PALMER
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315 Pages, 6x9. 205 Illustrations, $1.00

This is the first book to give the tool maker simplified methods for the selection and heat treatment of tool steel.

It is a handbook of modern practice for the men who are responsible for your tools. You will want it:

—to check up on your methods
—to get quicker answers to tool problems
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—to simplify your work

READ THESE COMMENTS:

". . . a valuable text book for apprentices and journeymen, and an equally valuable handbook for designers and others concerned with the use of tool steel."
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". . . Part Two offers a workable method by which anyone can make changes in the type of tool steel he is using with some understanding of the theory in back of his efforts."
CARL G. JOHNSON
Worcester Polytechnic Institute
Worcester, Mass.

"Here is a volume which the author calls a handbook but which is very much more. There is no question but that every tool maker and four out of five metallurgists, will know more about tool steels and their treatment after reading it."
K. H. CONDIT
Editor, American Machinist

"It is simple and easy to read and contains interesting and useful information which I am sure will commend it to technical men, semi-technical men and men in the shops who want to improve their ability to make the best use of tools and tool steel."
PROF. BRADLEY STOUGHTON,
Department of Metallurgical Engr. Lehigh University,

315 Pages $1.00 in the U. S. A. postpaid

Just a few of the problems this book will answer for you:

HOW to stop tools from warping—How to avoid grinding checks—How to make tools wear longer—What furnace atmosphere shall I use?—How to make the spark test—What is a Monotron Hardness Tester?—Shall I quench in fresh water or brine?—How does tool design affect cracking?—What is the Shepherd P-F Test?—How to make tools that won't break—How to prevent size change—How to be a trouble shooter.

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Please send me postpaid the convenient new 315 page handbook—"Tool Steel Simplified." I am inclosing $1.00. (Price $3.50 outside U. S. A.)

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The New SUNDSTRAND *Tool Grinder*

ACCURATE—The New Sundstrand Tool Grinder creates the accuracy of cutting angles demanded by modern high-production. It is easily adjusted to a fraction of a degree so that diamond finishing can be concentrated near the edge to provide the extra keenness and smoothness which lengthens tool-life and increases production between grinds.

FAST—This precise machine tool is easily set up and operated. Correct angles are established quickly and changed over with equal speed. The wheels cut freely and rapidly. Sensitive controls and copious supply of coolant enable the operator to work at maximum speed.

ECONOMICAL—This well built, accurate, high grade machine tool is moderately priced, most economical to operate. It cuts cost of tool grinding, protects investment in cutting materials; saves "down time", increases production and return on capital invested.

Get details, write today for Bulletin GR—637.

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RIGIDMILS - STUB LATHES
Tool Grinders - Drilling and Centering Machines
Hydraulic Operating Equipment - Special Machinery

Chapter News

(Continued from Page 24)

We are sure that he has the co-operation of the Milwaukee Chapter in making the A.S.T.E. one of the largest and best professional engineering societies in the country.

Mr. Otto Skagar, Master Mechanic, International Harvester Co., was among our guests. We hope to see the boys from the "Harvester" taking an active part in the organization, thanks to Cliff Duasault.

Mr. Rutzen, assistant chairman of the Milwaukee Chapter, has informed the publicity committee that his initials are E. A. Rutzen—we apologize.

It has been rumored that our friend S. C. Jorgensen of Milwaukee Press & Machine Co., has given up "fishing" for good.

Mr. Art Johnson, Cutler-Hammer Co., addressed the apprentices of that concern on "Tool Making."

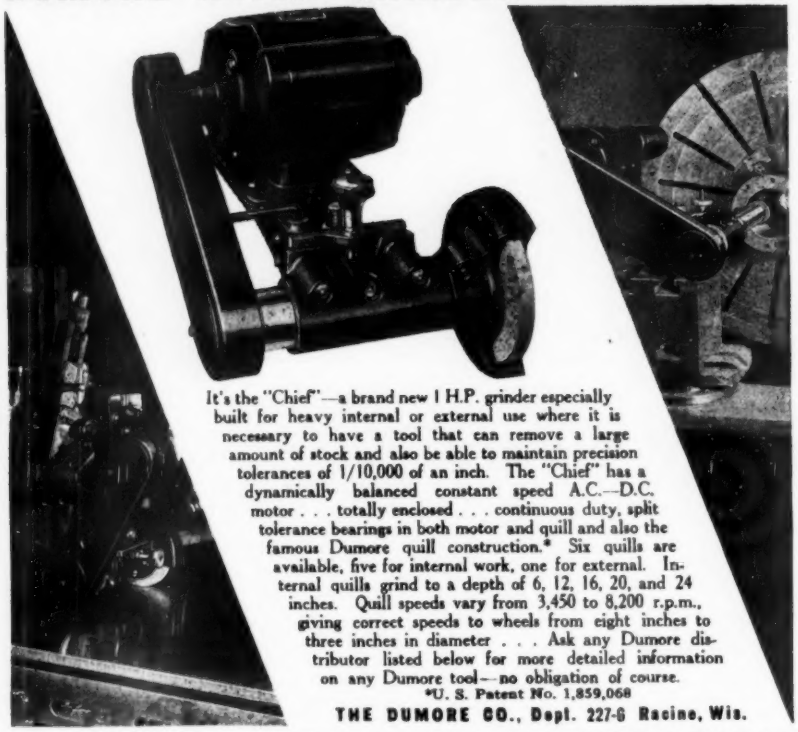
Mr. E. A. Rutzen spoke at the closing exercises of the Milwaukee Vocational School on "Tool Room Scheduling."

Mr. V. L. Impt, Tool Engineer, Allis-Chalmers Co., was guest of honor at the Marquette University Silver Jubilee dinner given by the Alumni association of the University. Mr. Impt was a member of the class of 1912 of the College of Engineering, which was the first class of its kind to be graduated from the University. Mr. Impt is also a widely known philatelist.

NOTICE

Milwaukee Chapter A.S.T.E will hold a picnic on Saturday August 7th at Howard Avenue Park, on Howard Avenue, near Rapid Transit street car tracks. Come early and bring your families and friends. Members see officers for tickets.

PRESENTING..THE MOST *Powerful* DUMORE LATHE GRINDER EVER BUILT



It's the "Chief"—a brand new 1 H.P. grinder especially built for heavy internal or external use where it is necessary to have a tool that can remove a large amount of stock and also be able to maintain precision tolerances of 1/10,000 of an inch. The "Chief" has a dynamically balanced constant speed A.C.—D.C. motor . . . totally enclosed . . . continuous duty, split tolerance bearings in both motor and quill and also the famous Dumore quill construction.* Six quills are available, five for internal work, one for external. Internal quills grind to a depth of 6, 12, 16, 20, and 24 inches. Quill speeds vary from 3,450 to 8,200 r.p.m., giving correct speeds to wheels from eight inches to three inches in diameter . . . Ask any Dumore distributor listed below for more detailed information on any Dumore tool—no obligation of course.

*U. S. Patent No. 1,859,068

THE DUMORE CO., Dept. 227-G Racine, Wis.

THESE DISTRIBUTORS STOCK DUMORE TOOLS

AKRON — Hdwe. & Supply Co.
ATLANTA—Fulton Supply Co.
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NASHVILLE—BuforBros., Inc.
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PORTLAND, ORE.—J. E. Hasseltine & Co.
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SEATTLE—Cragin & Co.
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Kirkby Mach. & Supply Co.
National Supply Co.
TORONTO
Canadian Fairbanks-Morse
TROY, N. Y. —Fred K. Blanchard
TULSA—Mach. Tool & Supply Co.
WORCESTER, MASS. — Walte Hdw. Co.
YORK, PA. — York Machy. & Supply Co.
EXPORT DEPT.—Dumore Co. —New York.

PITTSBURGH

J. H. Thomas, Chapter Publicity Chairman, 7442 Pennfield Court, Pittsburgh

The regular meeting of the Pittsburgh Chapter was held Friday, June 11th in McKeesport, Pennsylvania.

The chapter members and friends were guests of The Firth-Sterling Steel Company. A fine dinner was served in the Penn-McKee Hotel. Mr. J. R. Weaver then opened a short business meeting. Among the guests were Mr. Runar Hernberg, Dipl. Engineer, Assistant to Technical Manager of W. Rosenlew & Company A.B., Bjorneborgs Works, Bjorneborg, Finland. He spoke briefly about his country and gave a word of praise for the cordial treatment he received in this country.

Mr. D. G. Clark was then introduced and spoke words of welcome on behalf of Firth-Sterling. The speaker of the evening, Mr. Malcolm F. Judkins, Research Engineer of the company and member of A.S.T.E. was introduced and asked that we adjourn to the largest building in the U.S.A. built especially for and devoted exclusively to the manufacture of tungsten carbide tools and dies, which is the new home of "Firthite and Firthaloy" products of Firth-Sterling Steel Company.

Mr. Gerald L. Firth, president, was on hand to welcome the group in the new building and show us to the reception hall where a talk was given by Mr. Judkins. About seventy-five members and guests availed themselves of this privilege.

The next meeting of the Pittsburgh Chapter will be held in October. Watch for the date, time and place in the September issue.

See Handy Andy's Workshop in this issue for "Small Tools" from

(Continued on Page 30)

Typical of the uses of

FIRTH-STERLING PRODUCTS

at I. B. M.

CIRCLE ©
SUPER HIGH SPEED STEEL KEEPS TOLERANCE WITHIN —.0000" AND +.0005"
CROMOVAN
CROMOVAN TRIPLE DIE STEEL PUNCHES "TABULATOR CLUTCH GEAR CAMS" ACCURATELY

FIRTH-STERLING PRODUCTS

Firthite Sintered Carbide Tools
Firthite Sintered Carbide Blanks
Firthaloy Wire Drawing and Extrusion Dies
Circle © Super High Speed Steel
Blue Chip High Speed Steel
Tungsten Hot-Work Steels
Cromovan Triple Die Steel
Invaro Oil-Hardening Steel
C. Y. W. Choice Hot-Work Steel
Special A. S. V. Steel
J-S Chisel and Punch Steel
Firth Winged Ingot Steels
Sterling Stainless Steels
Sterling Nirosta Steels
Globe Drawn and Ground Bars, Drill Rod and Wire
Firth-Sterling Special Tool Steel

Tool and Die Steels for Every Purpose

Firth-Sterling Products increase output per machine, lengthen life of tools, and improve accuracy . . . on long runs or small quantity special production. They can create economies in many parts of *your* plant. Technical literature will be sent at your request.

FIRTH-STERLING STEEL COMPANY

Works: McKEESPORT, PA.
NEW YORK CHICAGO
HARTFORD PHILADELPHIA
LOS ANGELES DETROIT
CLEVELAND DAYTON
GLOBE WIRE DIVISION
McKEESPORT, PA.

SEND FOR CATALOGUE

FEATURING

FEATURES OF THE J&L THREAD GRINDER

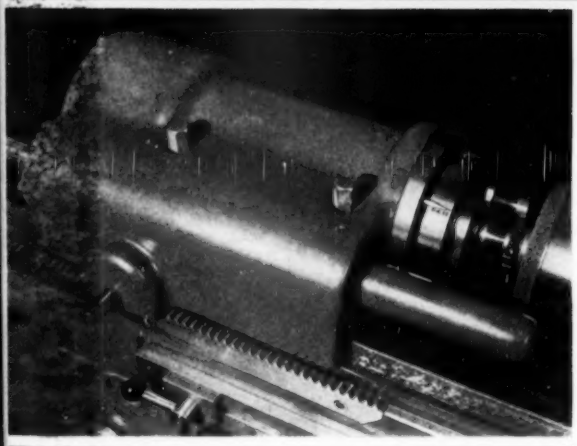


Fig. 1

HEADSTOCK AND WORK-SPINDLE

Provision is made on the work-spindle for correcting backlash when grinding in both directions. Graduations on the spindle nose facilitate the grinding of multiple threads. An accurate straight jaw clutch is disengaged to permit indexing when grinding double, triple, quadruple, or sextuple threads.

Fig. 2

AUTOMATIC TRUEING AND SIZING

The automatic trueing device will true the wheel at any time as predetermined by the operator. The device always remains in a fixed position in relation to the work. The grinding wheel is fed in automatically until the correct size is reached, at which time the feed stops automatically.

JONES & LAMSON MACHINE CO.,

TAPER ATTACHMENT

By inserting a hardened and ground former of the desired taper, the machine will reproduce this taper on the work. *When changing from straight to taper threads no adjustments are required for lead or form.* Whether the former is taper, combination of straight and taper, or double taper, this shape will be reproduced in the work. See Fig. 3.

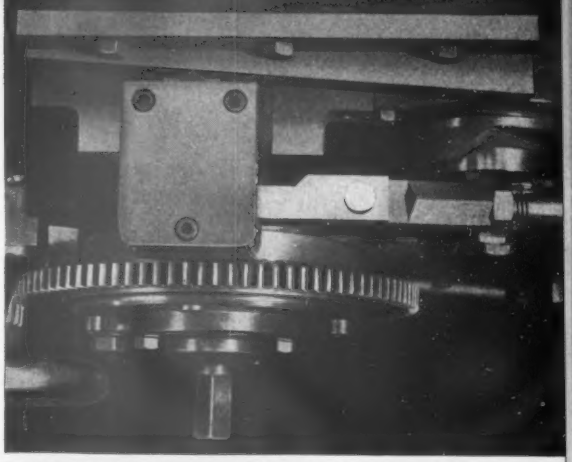


Fig. 3

SINGLE LEVER WORK SPEED SELECTOR

A single lever control, Fig. 4, with direct reading dial permits rapid selection of the proper work speed. When grinding in one direction only, the automatic rapid traverse may be used to bring the work back to the start of the grinding position.

Fig. 4

RELIEVING ATTACHMENT

The relieving attachment, Fig. 5, permits grinding relief on taps and hobs having from 2 to 12 flutes. On taps any portion of the lands may be ground concentric before the relief starts.

Fig. 5

ANNULAR GROOVE ATTACHMENT

The annular groove attachment feeds the wheel to depth then backs it out of the cut. The work is advanced equal to the pitch, then the wheel is fed again into depth. This action is repeated automatically until the work is completed.

This attachment, together with the relieving attachment, makes it possible to grind relief on straight or taper thread hobs (without lead), with either straight or spiral flutes.

REAR VIEW

Fig. 6

Routing Large Jobs

(Continued from Page 17)

manner. When the raw materials are ordered on a methodical basis they may be contracted for ahead on a larger basis, thus cutting down the purchase costs. It also helps to establish predetermined cost records.

Purchases

What is purchasing? The job of a purchasing agent is to have at all times the costs of raw materials and the requirements.

The requirements have been partly explained under the heading of incentives. The actual quantity of each kind of raw material has been determined in the way of scheduling, planning in the production department, and governed by the amount of sales as has been explained under the heading of Production Scheduling.

Receiving

After the Purchasing Agent has ordered the materials and it has been received by the Receiving Department, the material should be inspected and counted, stock record cards made out, and the materials then sent to stores. The Receiving Dpt. should be in close touch with the Purchasing Dept. at all times to have information concerning arrival of material. This information should be always available for the Planning Dept. and those concerned with general production supervision."

WELDON
END-MILLS
Improved Performance
Look at the Mill from every angle
A STRONGER MILL.
Faster cutting.
Double-ended.
Yet costs no more.
1. No nicks for chips to clog in, or to weaken teeth.
2. Cupped Center on end provides for more re-grinds.
3. Fast Spiral Design. Heavier formed teeth... yet more chip clearance.
Increase YOUR Production with
WELDON END-MILLS
PAT. PEND.
THE WELDON TOOL CO.
321 FRANKFORT AVE. CLEVELAND, OHIO
Pioneers in Fast Spiral Double-end End Mills

Chapter News

(Continued from Page 26)

the Pittsburgh Chapter.

RACINE

T. J. Santry, Chapter Publicity Chairman, 1615 Racine Street, Racine, Wisconsin

Efficiency is a more important factor in the return of prosperity than is distribution, Ford R. Lamb, Detroit, National Executive-Secretary of the American Society of Tool Engineers declared at the banquet winding up the annual spring frolic of the Racine Chapter held at the Meadowbrook Country Club, Racine, on June 4th.

The speaker stated that one means of abolishing unemployment and bringing back permanent prosperity is by increasing efficiency in industry. This can be accomplished, Mr. Lamb said, by inducing more youths to enter the skilled trades. Tool Engineers are the logical ones to start this program as they turn out the tools of industry. By increasing efficiency, costs are reduced, he said, thus enabling more persons to buy manufactured products. When more products are purchased, more men will be employed in industry, Mr. Lamb stated.

The speaker told of the growth of the American Society of Tool Engineers and commended the Racine Chapter for the progress it has made in the past year under Chairman Harold D. Hiatt, who served as toastmaster.

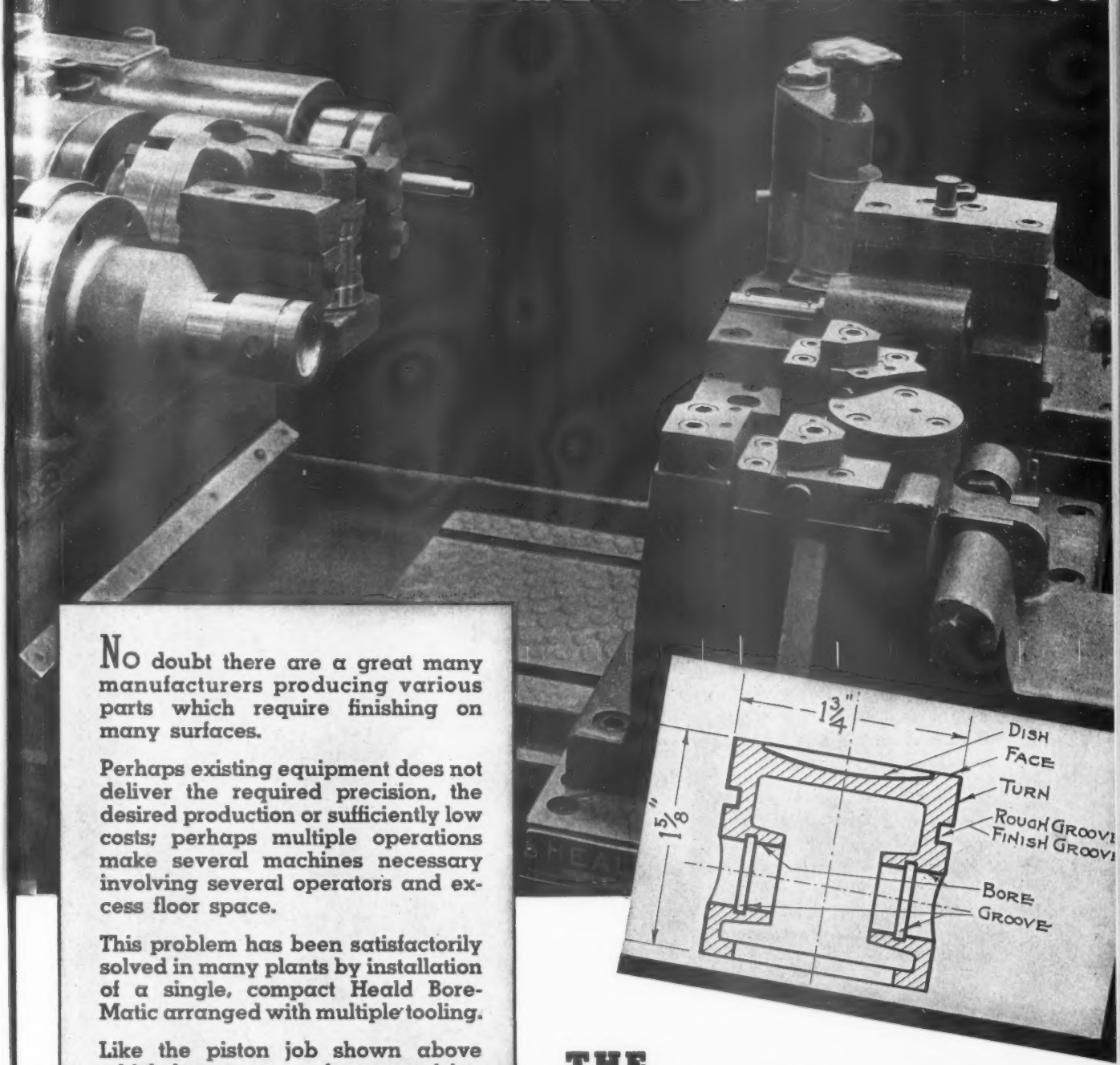
Other speakers were Hertle Saugman, who extended greetings to the society and "Tex" Reynolds of the Racine Journal Times, who gave a talk in which witty puns were made concerning quite a number of the guests.

The banquet ended an afternoon of sports and amusements, including a blind bogey golf tournament. At the close of the dinner approximately eighty prizes were awarded to winners in the various events and

(Continued on Page 38)

MULTIPLY PROFITS

with Multiple Precision Operations on HEALD BORE-MATICS



No doubt there are a great many manufacturers producing various parts which require finishing on many surfaces.

Perhaps existing equipment does not deliver the required precision, the desired production or sufficiently low costs; perhaps multiple operations make several machines necessary involving several operators and excess floor space.

This problem has been satisfactorily solved in many plants by installation of a single, compact Heald Bore-Matic arranged with multiple tooling.

Like the piston job shown above which has seven surfaces precision finished in one cycle on one Heald No. 48A Bore-Matic.

Results . . . greater accuracy . . . higher production . . . lower costs . . . in short, multiplied profits.

THE

Heald Machine Co

Worcester, Mass., U. S. A

HANDY ANDY'S ..WORKSHOP..

As previously suggested, the A.S.T.E. Speakers Club rather intrigues my interest. Native Yank and Yank by adoption, the boys get together to promote good speech and good fellowship, to learn to think on their feet. Each rides his pet theme; management, the metric system, vitamins and sex hormones, dandelions and fertilizers—ah, there is variety! Now I know what makes our virile Auge Ketelsen go twistin' the tails of jungle tigers. (He was weaned on Danish pumpernickel.)

▼ ▼ ▼

To my Hall of A.S.T.E. Fame, open to new entrants, I elect Charley Staples, Luke Beach and Lee Diamond, all of Detroit. Not that they have done anything particularly remarkable, but what they have done has been done remarkably well. Quiet guys, you know. Also, Otto Winter, of Toledo, for being a live wire, and Bert Carpenter, late of Chicago but lately succumbed to nostalgia. And demme if I ain't minded to include all of Pittsburgh Chapter, only, I'm not wholesaling —yet. But there's a live bunch, take it from me.

▼ ▼ ▼

No question about the A.S.T.E. being an international society now, what with Milwaukee and the Twin Cities on our rolls. Gesundheit!—och Skoal! Right up to the third button, gents!

▼ ▼ ▼

Here is the way D. L. Shelley of Pittsburgh sends in his stuff:

"Small Tools From Pittsburgh Chapter"

Regular meeting held in the Norse Room, Fort Pitt Hotel. J. R. Weaver in the chair. D. L. Shelly recording the transactions. D. R. Rennie and E. E. Griffiths giving the glad hand to all present. The playboys use that world series ball game in the lobby 'till it's time to put on the nosebag. Will have to call the game in the 7th inning—we were ten minutes late.

No left turns at the foot of the stairway leading to the Norse Room.

For J.J.S. and J.G.B. at the center table—keep one foot on the floor when reaching for food.

Said the head waiter to John G. Bunker: "How did you find your steak?" "I looked under my potato and there it was."

Harry Barney, President of Barney Machinery Company, came too late for his eggs. McCroskey Tool Corporation is at Meadville, one hundred miles away, but Walter Greenleaf was on time . . . .

Ross and Gang were victims of the "Honest Magician."

Grace and Dinger of Robertshaw Thoermostat brought their production engineer, George Wilson, along as guest.

James R. Barbor, a visitor from the Westinghouse Air Brake Co., can come back any time as a guest—or better still, as a member.

Bill Uecker can do a little missionary work by bringing Malcolm Judkins along.

Heard after the movies on die castings, from Dave Rennie: "What, no Mickey Mouse?"

Are you planning to spend your vacation in any of the cities with

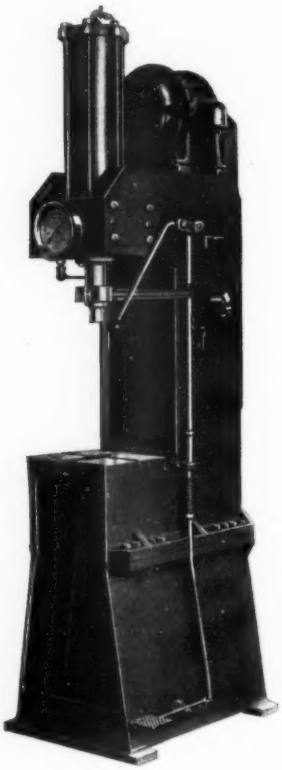
(Continued on Page 34)

"LOGAN"
HYDRAULIC PRESSES

"LOGAN" Saves
TIME
EFFORT
MOTION

"LOGAN" Hydraulic forcing presses, of standard design, are made in sizes of from one to fifty ton capacity. From one to five tons, press is furnished for bench mounting or with a sub base. From five to fifty tons the base is an integral part of the press frame.

Many special "LOGAN" Hydraulic presses, have been engineered and built for our customers' special needs. The wide and varied experience of our engineers gained over a long period of years is at your service in solving your press problems. Let us help you save time, effort, and motion.



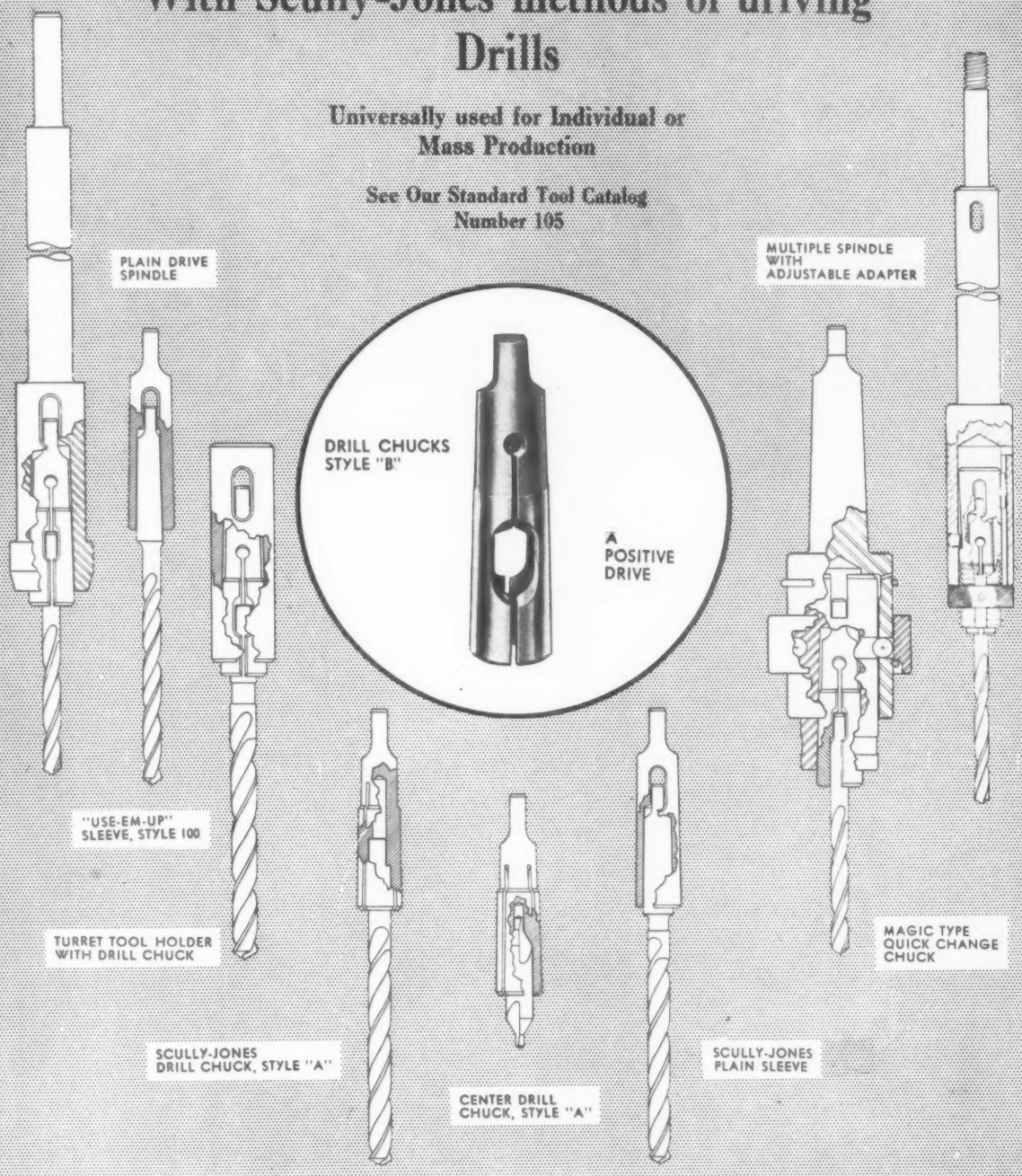
LOGANSPORT MACHINE INC.,
LOGANSPORT, IND.

Standardize . . .

With Scully-Jones methods of driving Drills

Universally used for Individual or Mass Production

See Our Standard Tool Catalog Number 105


PLAIN DRIVE SPINDLE
MULTIPLE SPINDLE WITH ADJUSTABLE ADAPTER
DRILL CHUCKS STYLE "B"
A POSITIVE DRIVE
"USE-EM-UP" SLEEVE, STYLE 100
TURRET TOOL HOLDER WITH DRILL CHUCK
MAGIC TYPE QUICK CHANGE CHUCK
SCULLY-JONES DRILL CHUCK, STYLE "A"
CENTER DRILL CHUCK, STYLE "A"
SCULLY-JONES PLAIN SLEEVE

SCULLY-JONES AND COMPANY

1903 SOUTH ROCKWELL . . . . . CHICAGO, ILLINOIS

Handy Andy's Workshop

(Continued from Page 32)

Chapters of the A.S.T.E? Write to the Chairman or Secretary and plan to visit their plants.

What do you think of the old question discussed on page No. 14 of the May Tool Engineer?

▼ ▼ ▼

A fine idea—and worth passing along. Anyway, you see why Pittsburgh is the answer to an editor's prayer. The idea will take hold, providing variety, brevity, Society as well as reader interest. Thanks, Pittsburghers, for starting a good thing.

Had a letter from one of our advertisers (incidentally a friend) panninghelloutofme for something or other I'd written. Well, you know, the Editorial Committee gets plenty of chances to make mistakes, and we have to learn to take it. It's all in the game, and no hard feelings. I merely wish to point out that the Editorial Committee concerns itself with technical and Society matters only, with absolute impartiality toward our advertisers. We are working to make this the best technical journal in the world, and advertisers have the advantage that their products are displayed to the men who do the buying. And have no fear—"The Tool Engineer" is being read.

▼ ▼ ▼

We are constantly improving "The Tool Engineer,"—for better appearance and easier reading. It is essential, as the Society grows, that we abridge Chapter News, eliminating routine matter more or less incidental to all Chapters and thus leave more space for the unusual. By making these items terser and peppier (see Pittsburgh above) we can not only interject the fun essential to promoting the good fellowship for which the A.S.T.E. is noted, but can better display the serious technical matter necessary to promote good tooling. I'll personally donate a half dozen cherry forks (wooden ones swiped from my favorite bar) to the guy who sends in the snappiest item for the August issue.

▼ ▼ ▼

Just to make you Big Town boys shake a leg, I want to tell you that Hartford Chapter is setting a good stiff pace and is getting somewhere. I know the spirit of that town, having sojourned there—oh, a hellofa whileago. I remember the time I went down to New Britain—or was it Bristol?—to see one of the early aeroplanes (get the archaic spelling) try to fly from the Fair Grounds. It didn't, but it was a lot of fun. Anybody know what became of Fred Brink, once Tool Room Foreman at Pratt & Whitney's? Oh well, those were the happy days!

▼ ▼ ▼

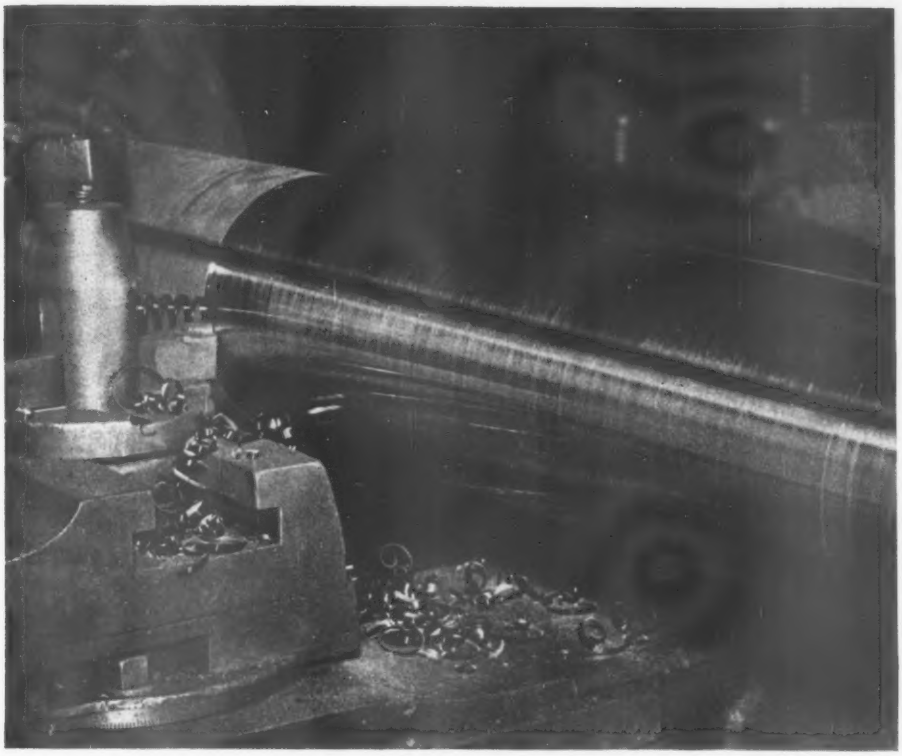
Wonder what the heckefelt's the matter with Providence, not having joined up by now. First thing you know, Woonsecket'll get the jump on the State Capitol. Me, I'm going back some day and eat clams at Crescent Park—uh, is it still running? You know, there's quite a few erstwhile New Englanders in this neck o' the woods, and when we get to reminiscing—well, I'll give you three guesses as to what we talk about. Among other things, of course. There's other things in life except clams and beans. There's sweet corn, too, steamed in seaweed.

▼ ▼ ▼

Drop me a line once in a while, boys—I'm getting lonesome for the old places.

Handy Andy.

JACOBS
SINGLE PURPOSE
CHUCK
For High Production Drilling, Reaming and Tapping
★
Solid Taper Shank Perfectly Fits the Spindles for Absolute Accuracy
★
Positive Drive — No Slippage
★
Powerful collet jaws tightened with a wrench eliminate wear and damage to machine spindle—securely lock tool shank in engagement with the positive drive.
★
For Dimensions - Price List - and Part Numbers Write for Bulletin 6A
THE JACOBS MANUFACTURING CO., Hartford, Conn.
Jacobs Chucks



Turning a slotted bar of heat treated Chrome Vanadium Steel, quenched and drawn to 364 Brinell, using a Vascoloy-Ramet tip, grade EE, brazed on a Silman steel shank without milling a recess.

Vascoloy-Ramet	Feet Per Min.	Feed	Depth
Grade EE	150	.032″	1/16 to 3/32″

Intermittent cutting—a hard alloy steel shaft, 364 Brinell, with a ¾ inch slot—striking the cutting tool 75 times a minute!

Experts said no tool material would operate under such conditions.

But Vascoloy-Ramet, grade EE, turned the shaft with precision and finished with the cutting edge undamaged. Further, this tool was tipped without milling a recess, the V-R blank being brazed with Tobin bronze on a shank of Silman tool steel.

Vascoloy-Ramet is produced in 17 standard grades, of different tantalum carbide content, strength and hardness, to cover the entire range of machinable materials and machining needs.

Today, great industrial plants and small machine shops, as well, are finding "a grade for every use" the secret of faster production, more pieces per grind and lower operating costs.

VANADIUM-ALLOYS STEEL CO.
VASCOLOY-RAMET DIVISION, NORTH CHICAGO, ILL.

VASCOLOY-RAMET BLANKS

Vascoloy-Ramet is available in three forms, (a) completely finished tools, (b) milled and brazed tools, and (c) blanks. V-R blanks are furnished in 5 standard styles and in sizes to meet every requirement. To make tools with V-R blanks is a simple operation, fully described in a new instruction booklet, available free—upon request.

VASCOLOY-RAMET

. . . The TANTALUM CARBIDE TOOL MATERIAL . . .

A GRADE FOR EVERY USE

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New York . . . . . N. Y.
Springfield . . . . . Mass.
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Knoxville . . . . . Tenn.
Los Angeles . . . . . Calif.
San Francisco . . . . Calif.

TRY-OUTS

"It is hard, sometimes, to tell whether we are making any progress. Doubts come to all of us. Lloyd Douglas, the author of 'Magnificent Obsession' and 'Green Light' tells the story of a Professor of Biology in a Canadian University who was visiting a colleague who had a little girl seven years old. The little girl had a goldfish who was not well and she asked the professor to take it home and put it in his aquarium for observation. So he wrapped it up in a damp handkerchief, and being an absent-minded professor he forgot about the goldfish and jerked the handkerchief out of his pocket while he was crossing the park and the goldfish took a nosedive into a snowbank. So the professor went down on his hands and knees to see if he could find the fish. A bobby came along and said, 'What are you doing there?' And he said, 'I am hunting for a goldfish.' You see the possibilities of this thing. And the bobby said, 'Well, don't you think this is rather a cold night for goldfish. I don't think you can be very well. I tell you what you do, you stay right here and I will go over and call the wagon and you can go down to the station where you will have a nice warm place to sleep' . . . Just then the professor found the goldfish and he held it up and said, 'Look, here is the goldfish.' And the policeman took one look at it and said . . . 'And I will go with you.' Doubts come to all of us at times but we have to keep going on. There was the spinster in a small town who had done many good works in her life and in the course of time she passed away and the grateful citizens decided to erect a monument in her honor. They asked a local newspaper man to write the epitaph. He wasn't sure how to go about it as his specialty was baseball, so he wrote the following:

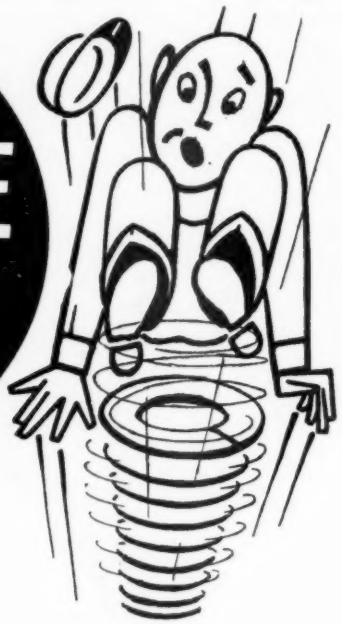
Here lie the bones of Nancy Jones
For her death held no terrors,
Born a maid, she died a maid,
No runs, no hits, no errors.

"Now the fifth and last fear which all of us have is the fear of the unknown. We think the greatest danger lies over the horizon. We can deal with the things that we can see. It is the things which are hidden which terrify us most. Primitive man was brave in the face of physical danger and yet fled in terror from the unknown. So many people have a fear of death, because that is one journey which we must all undertake alone. Death is a queer thing anyway. You read in the papers awhile ago about the terrible tornado that swept down through Gainesville, Georgia. The most remarkable thing about that was—(I read it in the paper, you probably saw the item) within three minutes this tornado with a roar like twenty freight trains struck a factory building and just blew it up as though there were dynamite in it, killing a lot of people. Now the strange thing about that was that there was one man who somehow seemed to have a warning or premonition and just before things hit he crowded a lot of the men over into the northeast corner of the building, just drove them over there, and that was the only part of the building that wasn't blown away. Those people were unharmed, all the others were killed.

"The more I think about this matter of death the more I am convinced we are wrong in our atti-

(Continued on Page 38)

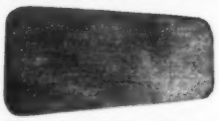
BUY PRESSURE NOT JUST STEEL!



You'll get plenty of kick out of these new Danly flat rounded springs—they're new and entirely different—livelier—stronger—longer lasting! They're engineered to combine a maximum flexibility with carrying capacity and compression.

DANLY FLAT ROUNDED DIE SPRINGS

● The reason they're better lies in the fact that they are made of a special analysis keystone wire which, in destruction tests covering three years, showed the highest fatigue life ever known in spring steel. The keystone wire when coiled, takes a rectangular cross-section to give it equal strength on both inside and outside spring diameters—greater carrying capacity for hole size. It means longer life and fewer spring replacements for you. *The new Danly Spring Chart describes it more fully. Send for your copy today.*



The special analysis steel wire is drawn in this keystone shape.

When coiled, it takes this shape to give it greater strength, longer life. When you start with ordinary flat wire the exact reverse is true.

DANLY MACHINE SPECIALTIES, Inc., 2114 S. 52nd Ave., Chicago, Ill.

BRANCHES:

Long Island City, N.Y., 36-12 34th Street
Dayton, Ohio, 990 E. Monument Avenue
Detroit, Michigan, 1549 Temple Avenue
Rochester, N. Y., 16 Commercial Street
Cleveland, Ohio, 1745 Rockwell Avenue
Philadelphia, Pa., 3913 N. Broad Street
Milwaukee, Wisconsin, 513 East Buffalo St.

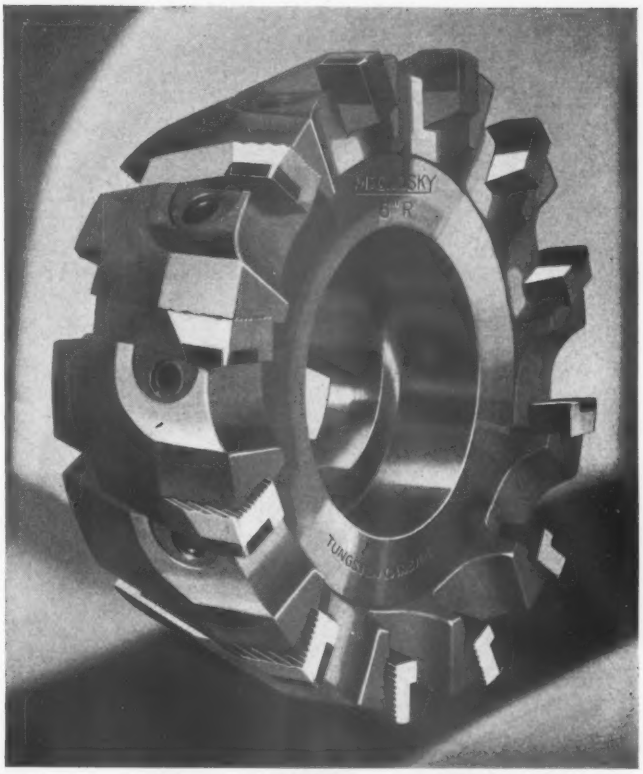
DANLY DIE MAKERS' SUPPLIES

Specially Designed for Tungsten Carbide

No Hammering required to lock and relock McCrosky JACK-LOCK Wedge when blades are adjusted

Adjusting Screw behind each blade permits accurate and economical adjustment

Full Support and Extra Relief machined into cutter body



McCROSKY

Jack-LOCK

Pat. Nos.
1,681,675
1,951,101

SHELL END MILL

with tungsten carbide tipped blades

McCROSKY
COST CUTTING TOOLS

Send for Bulletin No. 15-C today

Complete information on design and action of McCrosky JACK-LOCK Wedge; on McCrosky blade adjusting screws; on JACK-LOCK Shell End Mills and medium and heavy-duty Face Mills with T-C tipped blades

McCROSKY TOOL CORPORATION

1340-70 Main Street MEADVILLE, PA.

SALES OFFICES: CHICAGO, CLEVELAND, DETROIT, NEW YORK, PHILADELPHIA. REPRESENTATIVES IN CINCINNATI, LOS ANGELES, NEW YORK, SPRINGFIELD, MASS., ST. LOUIS, SYRACUSE, SAN FRANCISCO, TOLEDO, TULSA

Try-Outs

(Continued from Page 36)

tude. There is a remarkable play by Eugene O'Neil called 'Lazarus Laughed.' The scene is laid in the home of Lazarus at Bethlehem just after he has been raised from the dead. He is surrounded by his mother and father, his sisters Mary and Martha, and the neighbors. He had been dead for four days and now he was alive again. And they say to him, 'Lazarus, what is it like to be dead?' And Lazarus laughed; that is the name of the play, and he replied, 'There is no death, there is only life on both sides. Death is the fear you have when you pass over.' And that seems to me to be a very great saying, 'There is no death. There is only life on both sides. Death is the fear you have when you pass over.' And it may be that viewed from the other side what seems to us now like a dark and forbidding veil will then appear only as a golden mist.

"These, then are the five great fears of men. Accident and Disease, Loss, Failure, Displeasure of the Group, and Fear of the Unknown. There are two antidotes to fear by which we may overcome them. First of all there is knowledge. This world in which we live is the universe of law. Nothing happens by accident. You men know that. You know that you can't get results unless you conform to certain laws. Mechanical laws, electrical laws, chemical laws. Nothing happens by accident. That carries through in all departments of life. Sometimes we speak of luck or chance or accident. Like the little boy who said, 'Some people have all the luck. Look at Washington and Lincoln—both born on holidays.' Then, it takes hard work to find the laws. It takes thinking. It is hard work to think, that is why there is so little of it done. I have a boy taking Latin. I observed that he had something written in the front of his Latin book and I thought it must be something very important. I picked it up and this is what it said, 'In case of fire, throw this book in.' Not an uncommon attitude toward thinking which is hard work so we don't do any more of it than we have to.

"This is a world of illusion. One woman moved into a flat that was very up-to-date and had modernistic furniture and she slept in a bed for three weeks before she found out that it was a bookcase. It is easy to be mistaken. A little boy was running around in the yard and he fell down and tore a hole in his trousers so his mother told him to take them off and she would mend them. She missed the little fellow while she was working on them and hearing a noise in the basement she called down the stairs, 'You little rascal, are you running around down there without your trousers?' And a big deep voice said, 'No, ma'am, I am reading the gas meter.' It is so easy to be mistaken."

Quoted from an address by Chas. M. Newcomb, Detroit, A.S.T.E. meeting.

THE RIGHT TOOL FOR EVERY JOB
THE RIGHT TOOL at the production end of the machine is an important item in the set-up, for production is hampered unless the cutting tools are fully equal in design and quality to the fast, powerful machines on which they are used.
Order from Stock—You're Sure of the Best
MATERIALS—WORKMANSHIP—DESIGN are all combined in Gairing Cutting Tools to meet the requirements of modern high speed production. The standard Gairing line is comprehensive and contains the most complete line of standard modern end cutting tools available.
SEND FOR CATALOG of the Gairing line on your company letterhead — put your special problems up to us. A Gairing representative is near to serve you.
THE GAIRING TOOL CO.
1629-35 WEST LAFAYETTE • DETROIT, MICHIGAN

Chapter News

(Continued from Page 30)

a number of the gifts were given as door prizes. One hundred Tool Engineers and guests were in attendance and all report having enjoyed the frolic.

TOLEDO

W. L. Ulrich, Chairman, Publicity Committee

The Toledo Chapter did not have a regular monthly meeting in June. We did have, however, a very successful dance on Friday, June 18. This dance was held at the New Secor Hotel Ballroom which is air conditioned, and everyone was very comfortable in spite of the hot weather which prevailed. Approximately 100 couples enjoyed dancing to a fine seven piece orchestra and most of the brothers and sisters were of the opinion that they had a great time.

There are no regular meetings scheduled for July and August but

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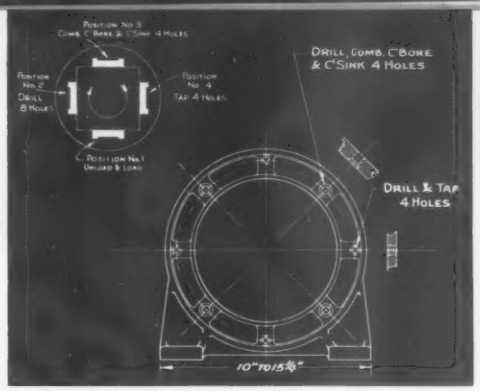
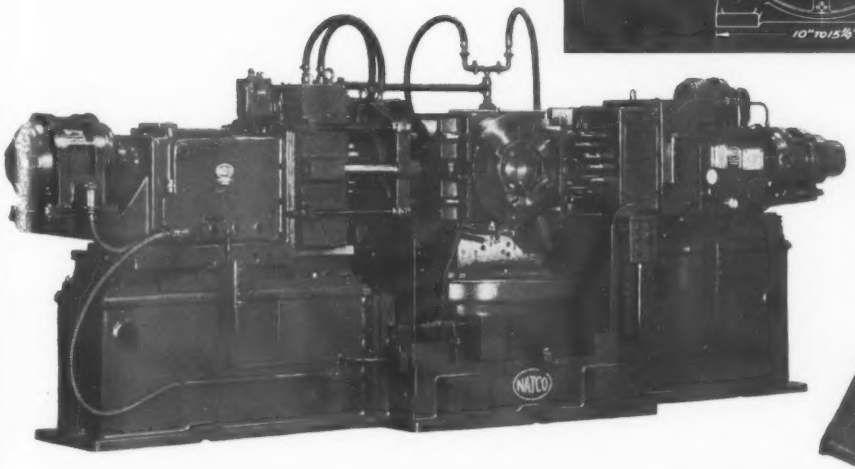




20 Operations are performed on 100 Stator Frames per hour...

Here is the NATCO method of drilling, counterboring, countersinking and tapping motor stator frames. This NATCO machine is performing a total of 20 operations on 100 stator frames per hour.

This machine is built of three NATCO HOLEUNITS and a four position rotating type fixture arranged to hold one stator frame in each position. The operator loads the stator frame in the front loading station and as the castings index from station the required operations are performed. See sketch above for detailed operations.

This NATCO three-way was built for a particular set of operations and may be considered special way-type equipment. Yet it is built of standard NATCO HOLEUNITS . . . standardized machine elements which are flexible and interchangeable. NATCO HOLEUNITS are completely self-contained and no connections other than electrical are required. Equipped with a semi-automatic hydraulic feed, they will operate at any angle . . . and may be arranged in groups to perform all the required operations with a single handling. Should the part for which the units are arranged be altered or discontinued, it is only necessary to rearrange the units, equip them with new spindle boxes and the machine may be used for an entirely different piece of work.

NATCO HOLEUNITS are built in a variety of sizes and capacities. Investigate them today. Call, wire or write for a NATCO representative today. They will be glad to make a study of your drilling, boring or tapping problems.

Chicago Office, 2009 Engineering Bldg.
Detroit Office, 409 New Center Bldg.

The National Automatic Tool Co.
Richmond, Indiana • U. S. A.

Reduce Production Costs! Investigate NATCO Methods Today

NATCO

Drilling, Boring and Tapping Machines

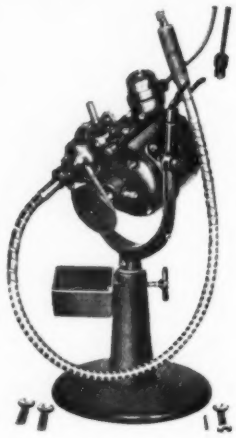
NEW *Equipment*

New Tool and Die Makers Machine

N. A. Strand & Company, 5001 No. Wolcott Ave., Chicago, have added to their flexible shaft machine line, a new tool and die maker's machine — Type MY-4 — consisting of a ¼ H.P. capacity motor; three speed ball-bearing countershaft with belt guard. Two combinations of speeds are available—1700, 3000

and 5200 R.P.M., and one with high speeds of 3400, 6000 and 10,400 R. P. M. Machine furnished with either combination as above.

Motor is mounted in a swiveling yoke, permitting the machine to swivel in all positions. A 4 ft. flexible shaft with a ball-bearing hand piece fitted with split collet is furnished with this machine. A toolbox is attached to the bench stand, which is provided with an adjusting



stud for raising or lowering the machine to the desired height.

A small ball-bearing right angle attachment, has also been designed, which is interchangeable with this machine, as illustrated above, arranged with split collet, for holding tools with round shanks.

The New Oster "Chaser Grinder"

The Oster Manufacturing Company of Cleveland, Ohio, announces a new grinder for threading dies and chasers of all kinds.

Equipped with a special fixture and wheel for each type of chaser to be ground, it is said to be simple to set up and operate. Micrometer adjustments make it possible to obtain a perfect grind on cutting edge and lead. A special, thin type grinding wheel makes it easy to grind out broken teeth. The new grinder is small and compact and is powered by a universal motor which runs from the ordinary electric light socket.

Standard equipment with the grinder consists of one set of special fixtures and wheels for grinding any one type of chaser; universal motor and dressing stick for grinding wheels.

New Grinding Unit

A new grinder known as the 3524-DP has been recently introduced by Mall Tool Company, 7754 South Chicago Avenue, Chicago, Ill. This grinder has a ½ H.P., 3450 r.p.m. ball bearing mounted constant speed motor, a 7/16" diameter by 6 foot flexible shaft which

MID-WEST-HYDRO-PIERCE-UNITS

--PIERCING WITHOUT A PRESS--

This new method of piercing assures you of—

1. **A more uniform product.**
2. **Saving in press and operating cost.**
3. **Reduction of assembly cost.**
4. **75% salvagable for next year.**
5. **Costs comparable with die costs.**
6. **Elimination of costly cam dies.**

The illustration shows a chair part of the metal tubing being pierced and embossed by a special adaptation of these Hydro-Pierce units.

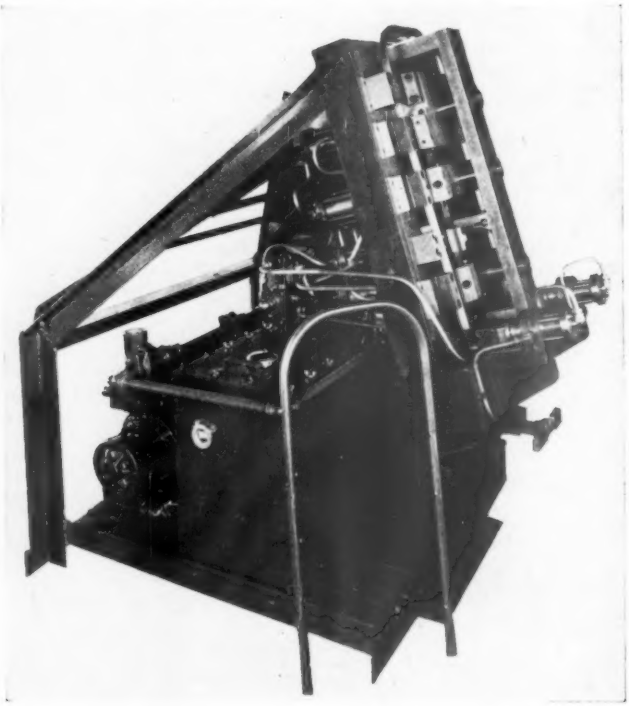
Get All The Holes In One Shot

Also suitable for short trimming and forming operations.

Write for complete details.

MID-WEST PRODUCTION ENGINEERING, INC.

1421 E. Milwaukee Detroit, Mich.



rotates within an internal bearing flexible housing. The angles and straight spindles have large bearings for ease of operation and long life.

The mounting has large easy roll-

ing casters. A tool tray is provided for tools and miscellaneous attachments. Like other Mall units, this grinder can be fitted with attachments for disc sanding, grinding, buffing, polishing, drilling and many other applications.

Modern Collet—Filler Pads

An exclusive feature, introduced recently and now furnished as standard with all collets manufactured by the Modern Collet and Machine Company, Ecorse, Michigan, offers, it is claimed, distinct advantages in increased screw machine efficiency and economy.

Felt filler pads, inserted in the slots of the collet, keep all oil, dirt, and chips from being carried inside the spindle. This permits, it is said, more efficient operation of the collet and its associated moving parts, as the handicap of dirt and grit is eliminated. When changing jobs, the removal of the collet is unhampered by dirt and chips which often are packed tightly inside the spindle.

Cutting oil is saved, it is claimed —particularly when a job necessitates the direction of a stream of oil directly toward the collet, the pads prevent the oil from passing through the collet and collet tube and out of the back end of the spindle where it is sprayed to the floor.

Federal—New Penetrometer

Federal Products Company of Providence, R. I., announce a new Penetrometer or Hardness Tester (Gage) for determining the hardness of rubber, cork, felt compositions, and similar materials. The gage is

(Continued on Page 42)

RADIAL DRIVE COUNTERBORES

Scientifically Designed by

Eclipse

Double Radial drive counterbore for heavy duty work developed on the simple fundamental principle of driving directly on line of center, with integral contact lugs machined from the solid.

A group of engineering specialists—PRODUCED by skilled mechanics—SOLD by practical sales representatives, combined together into a closely knit organization established in 1914.

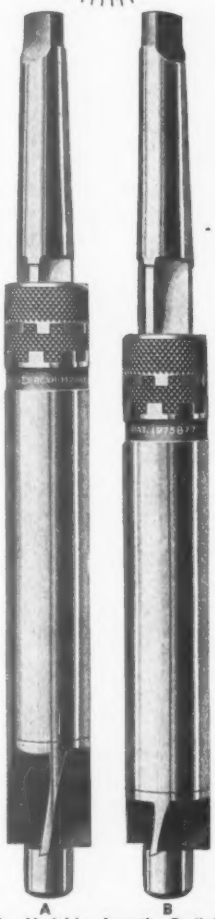
This modern unique combination of quick-detachable cutter and socket is the very latest answer to industry's demand for a sturdy, reliable, shock-proof and fool-proof interchangeable drive.

RADIAL DRIVE
Variable Length
HOLDERS
.001 Adjustment

A result of combining several simple well-tried principles into an accurate, rigid, compact tool. No screws, nuts or wrenches needed.

Ideal for multiple spindle operations eliminating necessity of maintaining counterbores in sets of matched lengths.

Two slight movements of the knurled adjustment vernier collars instantly compensate for variations in the lengths of cutting tools.



A B

A. Variable Length Radial Drive Holder with new full length cutter—see illustration at right showing application of the extension feature.
B. Same holder with partially used cutter, extended to original overall length of assembled tool to compensate for shorter cutter.

Send for Eclipse Catalog No. 35.
Factory sales engineers in all industrial centers.

ECLIPSE COUNTERBORE COMPANY
DETROIT 7410-30 ST AUBIN AVE MICHIGAN

New Equipment

(Continued from Page 41)

so designed that a true determination of the amount of penetration is obtained. Variations caused by surface irregularities are eliminated, it is claimed, by pressing the material first by a fixed amount and then allowing the penetrating point to find its own resting point. Constant pressure is maintained by weights.

For full details, specifications, etc., write to the Federal Products Company, 1144 Eddy Street, Providence, R. I.

▼ ▼ ▼

McCrosky Jack-Lock Milling Cutters With Tungsten-Carbide Tipped Blades

The "Jack-Lock Wedge" developed by McCrosky Tool Corporation, Meadville, Pa., for locking serrated blades in a tool body, has now been incorporated in McCrosky shell end mills and face milling cutters specially designed for tungsten-carbide tipped blades.

The "Jack-Lock Wedge" provides features, it is claimed, that have proved particularly suitable for tungsten-carbide applications. It is semi-circular in cross-section and occupies a semi-circular recess in the cutter body. Tightening the socket set-screw in the wedge lifts the wedge like a jack, forcing it over against the blade with a powerful compound wedging action that provides a rigid support and freedom from vibration. The "Jack-Lock Wedge" offers further protection to the tungsten-carbide tip because it can be unlocked and relocked without hammering when the blades have to be adjusted.

The cutter body is of the cone type so designed, it is claimed, as to give full support behind the tipped blade and ample clearance in front of the cutting-edge. The blades are set at proper shear and rake angles for tungsten-carbide. Serrations on the blades are horizontal and parallel to the bottom. The blades can be adjusted to compensate for wear in two ways, by moving them forward or by stepping them out from serration to serration.

The McCrosky design incorporates another feature that permits the most economical use of the tungsten-carbide tip. Behind each blade is an adjustment screw that engages threads in both walls of the blade slot and bears against the back of the blade. It assists, it is said, in securing a fine and accurate forward adjustment, and also permits each blade to be adjusted independently of the others, allowing a blade with a chipped tip to be reclaimed without sacrificing the tip material of the other blades in the set. Standard blades with a variety of tip sizes permit the selection of the tip most suitable and economical for a definite job.

Production Perspectives

(Continued from Page 18)

factory on a twelve acre site **in Glendale,** California. Land and **building** will cost **$86,000** and **$100,000 will be spent for machinery** and equipment for the first unit . . . Ground has been broken for a **new plant** to be constructed **at Compton** near Los Angeles by the **Pacific Wire Products Company at** an estimated **cost of $500,000.** The new plant will be designed and equipped **for** the **fabrication of screen wire** and when in operation will employ from fifty to sixty skilled workers with an average monthly payroll of $10,000.

New Chapters

Communicate with New Chapters Chairman, Roy T. Bramson, 2842 W. Grand Boulevard, Detroit, Mich., if you are interested in forming a branch of this Society.

GREATER ACCURACY . . . BETTER FINISH
. . . PLUS OTHER NOTED WETMORE FEATURES

Rugged construction, substantial long-lived blades, and easy adjustment distinguish the Type No. 7 Wetmore Adjustable Shell Reamer...another of the famous line of Wetmore Reamers, built to Wetmore precision standards. Write for Catalog No. 36.

• **SPECIAL TOOLS**

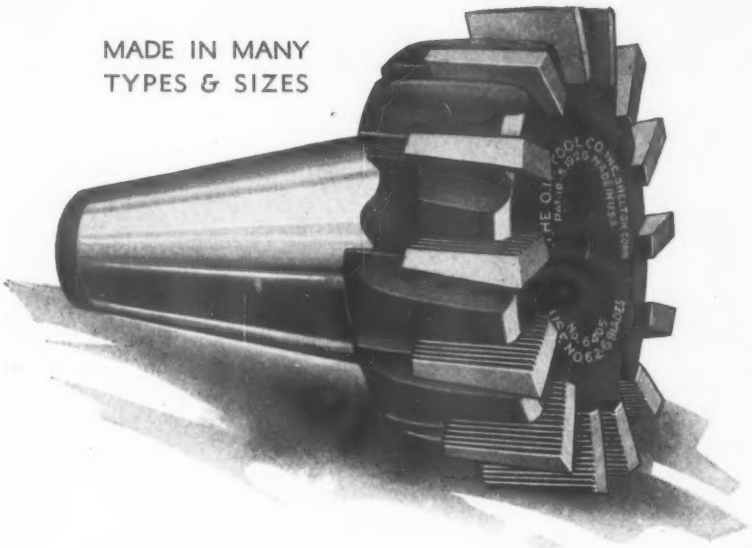
Designers and tool engineers are invited to avail themselves of our consulting service on all reaming operations—standard or special tools to decrease your manufacturing costs.

WETMORE REAMER COMPANY
Dept. TL 420 N. 27th St. Milwaukee, Wis.

Another Important Branch of the OK Family!

THE END MILLS

MADE IN MANY TYPES & SIZES



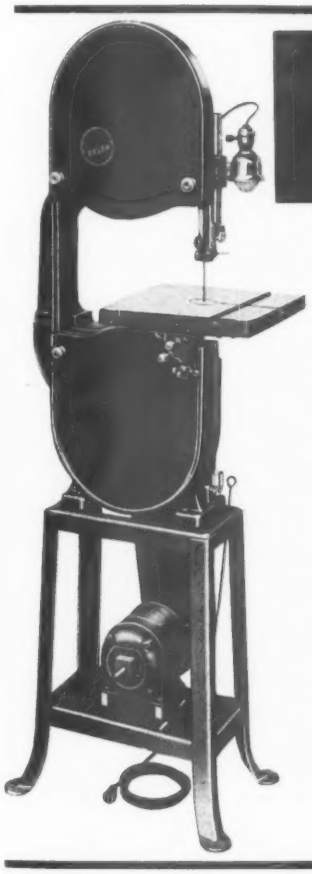
OK End Mills embody the inserted-blade principle which characterizes the entire O K line. In the End Mill, the cutting edges have a 2-way adjustment in line of wear, enabling the operator to maintain accurate circumference and level face throughout the life of the tool.

In O K tools only the blades are made of high speed steel. The body, which does no cutting, is of chrome nickel steel. The blades are specially tempered for edge-holding quality, the body for great strength—resulting in an efficient, flexible tool, good for long, satisfactory service. Glad to send catalog or representative on request.

THE TRADE OK MARK **SYSTEM**
OF INSERTED-BLADE METAL CUTTING TOOLS

Manufactured Only By
THE OK TOOL CO.
SHELTON, CONN.

New Metal Cutting 14 inch BAND SAW



The regular 14-inch Delta band saw, fitted with countershaft to reduce the speed, has been used in hundreds of shops for cutting Iron, Steel, Brass, Bronze and Aluminum bars, shapes and sheets; in foundries for cutting off gates, in die-casting shops for trimming and saving castings.

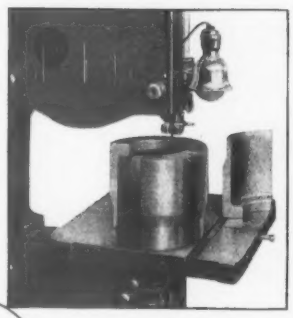
Here is a new and improved back-geared model which is even more ideal for this work. It is the perfect machine for the general machine shop, toolroom or experimental shop, where many different materials must be cut.

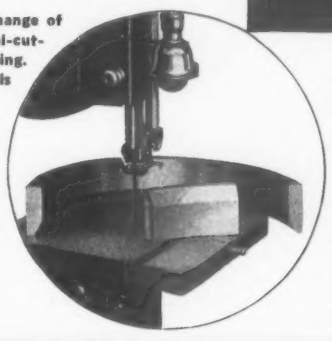
It takes the place of a power hacksaw in cutting off bars and shapes; it is used in the toolroom for sawing off tool, die and fixture stock; it will cut uniform strips from sheets; it saves hours of time in cutting templates and similar tools, and will cut almost any material, such as asbestos, mica, vulcanite, fiber, etc. . . . difficult to cut by ordinary means.

It will "double in wood," too, by a simple change of belts, as provision is made for four low metal-cutting speeds and one high speed for wood sawing. Write for special circular giving full details and specifications.

$79.50 14" back-geared Metal-Cutting Band Saw, complete with guards, 8" arbor pulley for wood and cone pulley for metal. With one 14-tooth metal-cutting blade. Without light attachment, belts, stand, motor or motor-pulley. Shipping weight 175 lbs.

DELTA MFG. CO.
676 East Vienna Ave.
MILWAUKEE, WISCONSIN





One of these draw-die segment rings was impractical to cut on the milling machine because of the diameter of cutter required; the other because the diameter of the ring was too large for the milling machine. Both, however, are cut with ease and speed on the Delta band saw. Try your next "awkward" job on one of these versatile tools.

Chapter News

(Continued from Page 38)

we are planning a moonlight boat trip on Lake Erie and a golf tournament with a party for the ladies.

TWIN CITIES

Minneapolis—St. Paul

Donald G. McKay, Chapter Publicity Chairman, 3314 Second Ave. So., Minneapolis

About sixty members and guests attended the dinner meeting of the American Society of Tool Engineers at the Minnesota Union on June 21, 1937. Mr. K. K. Roby, Chairman, presided.

After a fine dinner, Mr. Roby started the ball rolling by thanking those present for such a gratifying attendance despite the hot weather.

Mr. Gunnar Widen, Chapter Secretary, suggested that to speed matters up, the reading of the minutes of the previous meeting be skipped, as they had already been published in the July issue of "The Tool Engineer," which was agreed to.

The committee appointments were then announced, the Chairmen being as follows: Program and Meetings—A. G. Anderson, A. G. Anderson Co.; Membership—Herman Seaberg, Farwell Ozmun Kirk & Co.; Publicity—Donald G. McKay, Minneapolis-Honeywell Reg. Co.; Entertainment—R. W. Anderson, Minneapolis-Moline Co.; Editorial—R. E. DiVette, Minneapolis-Honeywell Reg. Co.

The chairmen were requested to start their committees functioning at once so that we could have a good start for the winter season at our September meeting.

The speaker of the evening, Mr. F. E. Gruber, Mechanical Engineer of Brown-Bigelow Co. of St. Paul, manufacturers of advertising novelties, was then introduced by Mr. Roby.

Mr. Gruber's subject was "Plastic Molding and the Design of Molds," which he certainly covered in fine style. He started with the various classes of compounds used, types of presses and the pressures used, different classifications of molds and their construction, and finished up with a description of some of the pitfalls one could encounter. Mr. Gruber also had with him a number of samples which he explained and which were then passed around. A number of molds, samples of material, and drawings were also furnished by Mr. George Wise, Tool Superintendent of the Minneapolis-Honeywell, for inspection, and a period of general discussion was enjoyed.

We wish to thank Mr. Gruber for a very entertaining and instructive evening and further extend our invitation to join our group—how about it, F. E.?

The meeting adjourned rather informally by mutual consent and everybody went home with a new conception of where and how some of these new pencils, cups, ash trays, etc., were made.

Interest in the A.S.T.E. is running high and all indications are that our next season is going to be a dandy. As the baby of the family, but a lusty one (and how), we have only had one regular meeting. Starting out with forty-two members (the second largest to receive a charter), the meeting Monday night was a good one with almost a 100 per cent member attendance and nearly 20 guests, in spite of the hot spell and vacation period.

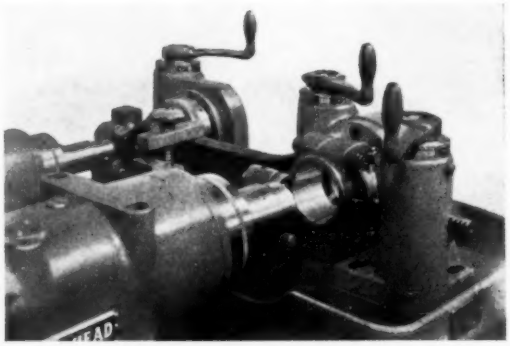
Watch us grow!

Chapter Publicity Men

Be sure your chapter is represented in the columns by sending in your material not later than the 20th of the preceding month.

Q-C ENGINEERING

Why Are More Q-C FIXTURE LOCKS in Use Today Than All Other Makes Combined?



Fixture for Boring Rods, designed and built by The Heald Machine Co., incorporating three Q-C locks.

BECAUSE—

First fixture locks available to the trade.

Strictly an impact lock, no inherent friction, only five moving parts.

No springs, toggles or other small parts to wear or break. Longer life guaranteed.

Furnished in four sizes to meet any required actuation and locking in either direction or both.

Remember that you can secure a complete assortment of "Standardized" racks, pinions, housings and other units from which practically any fixture may be assembled.

SEND FOR Q-C TOOL ENGINEERS REFERENCE AND STANDARDS BOOK GIVING COMPLETE DATA

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Designers and Builders of Dies, Jigs, Fixtures and Special Machinery

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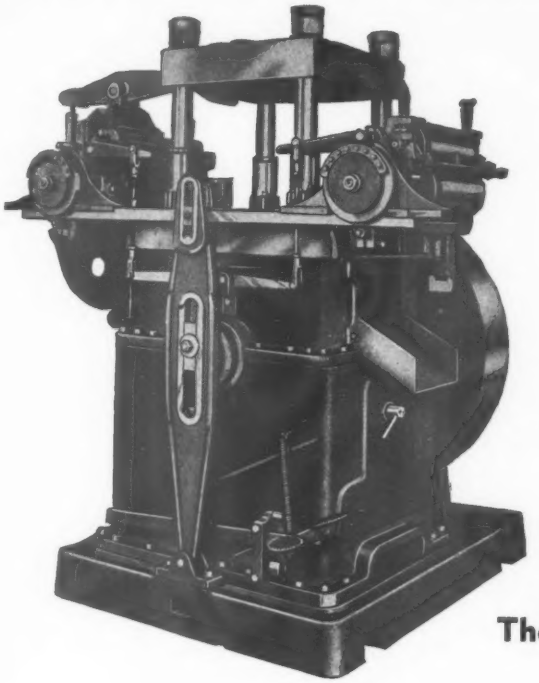

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Long Die Life
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Extreme Accuracy
Completed Stamping at each stroke

One Henry & Wright Dieing Machine will often replace a battery of conventional presses with corresponding saving in production cost. Designed purely for automatic production, the Dieing Machine reduces production cost to a minimum. Let us furnish production estimate.

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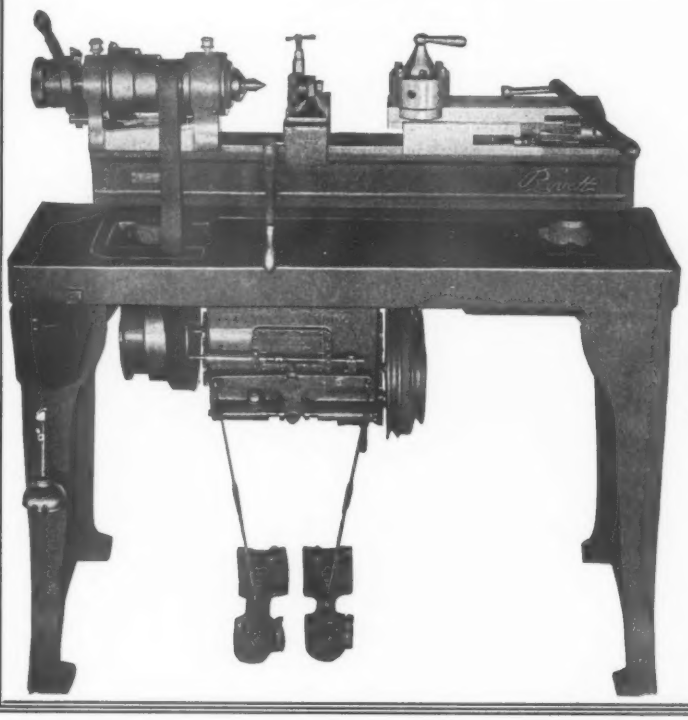
The Henry & Wright Manufacturing Co.
HARTFORD CONNECTICUT

RIVETT HAND SCREW MACHINE



The productive earning power of a Rivett Hand Screw Machine with Speed Box Motor Drive may well double that of old type counter or jackshaft driven units. Continuous duty is guaranteed with "trouble-free" spindle equipped with Timken "Zero" precision roller bearings or preloaded precision ball bearings.

Motor runs continuously, selective speeds are available by convenient foot or hand control and automatic brake stops spindle instantly for chucking new work. Double production from no lost time.

Bulletin 505 RB and 505 BB

RIVETT LATHE & GRINDER INC.
BRIGHTON, BOSTON, MASS.

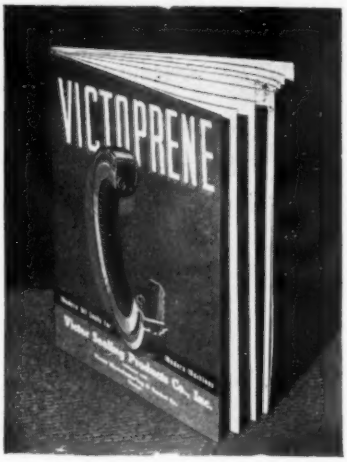
New Literature

of interest to the Tool Engineer

"The Story of Plastic Molding." This is a handsome forty-page booklet describing the use of plastics, applications of plastic materials, and methods of molding. It is issued by the Chicago Molded Products Corporation, 2145 Walnut Street, Chicago. Any firm using plastics or considering their use, should find this booklet a valuable aid. Its contents include an illustrated article on molds and how they are used, an explanation of the factors which determine price, a description of the various molding materials and their properties, hints on design, and a comprehensive listing of parts available from stock mold. Mention "The Tool Engineer" when writing for your copy.

▼ ▼ ▼

Victor Manufacturing & Gasket Company, 5752 Roosevelt Road, Chicago, has just issued a new and novel booklet of particular interest to tool designers since it contains data on various types of oil seals and installation information with a complete listing of various sizes available. Mention "The Tool Engineer" when writing for your copy.



▼ ▼ ▼

B. C. Ames Company, Waltham, Massachusetts—a circular describing the Ames Enclosed Head Precision Bench Lathe with Ball Bearing Spindle and new departure Transitory Drive. A complete description of this piece of equipment and useful attachments, as well as the specifications, are given.

American Broach and Machine Company, Ann Arbor, Michigan—Division of the Sundstrand Machine Tool Company of Rockford, Illinois, has just issued a circular describing the new Type PD (Pull Down) Broaching Machine. Complete information about the machine, which is a brand new product of this company, is given in the circular.

▼ ▼ ▼

Three new circulars which describe the **Rockford Machine Tool Company's** Double-Housing Hy-Draulic Planer, the 36-inch Hy-Draulic Openside Shaper, and the 12-inch High Speed Hy-Draulic Shaper, have been recently announced. The circulars contain complete information regarding each of these three new machines with specifications and are well illustrated.

▼ ▼ ▼

Armstrong Bros. Tool Company, 317 North Francisco Avenue, Chicago, has just issued a new circular relative to "Armstrong Drop Forged Wrenches" (Alloy Steel), Heavy Duty Box Socket Wrenches, Stub-end type for Tubular Handles, complete pictures, sizes and prices are

(Continued on Page 48)

H. R. KRUEGER & CO.
DETROIT, MICH.

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Manufacturers of
Multiple Drill Heads

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Special High Production Machinery

Exclusive Sales Representatives of
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Mr. President of a medium sized mechanical manufacturing organization, do you need an assistant who can help you in administrative, engineering, manufacturing, selling, advertising, sales and promotion? If so the advertiser's 17 years experience is available to you. Education: A technical graduate. Experience: Electrical field—Power production, motor and building supplies. Machine tool field—production parts, cutting tools, standard and high production special machinery. Location is secondary to opportunity.

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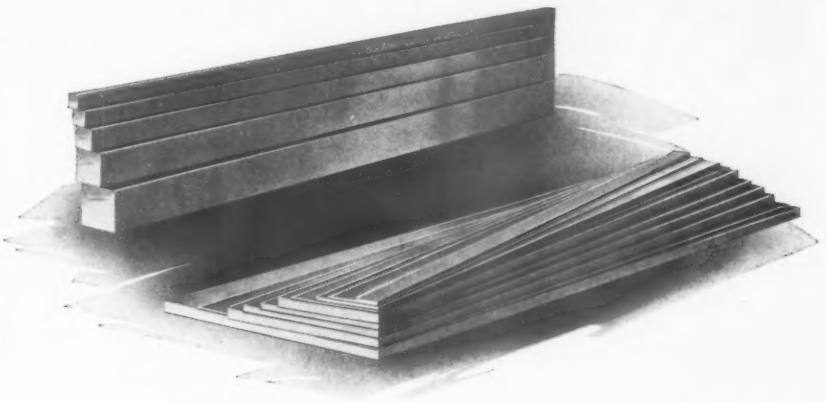
FIXTURES	SNAP GAUGES
PARALLELS	TEMPLATES
MACHINE PARTS	CUTTERS



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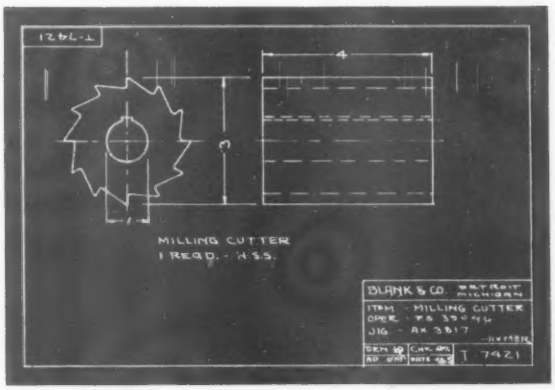
Steel Tapes—Standard for Accuracy
Dial Indicators for Every Requirement

Athol, Mass., U. S. A.

How many hours do your men waste hunting up stock and grinding it to size for these special tools and parts? Plug this source of waste by keeping a supply of Starrett Ground Flat Stock in the tool-crib. Made of first quality tool steel, cut lengthwise from the sheet, ground to within .001" of size and annealed for easy machining. Starrett Ground Flat Stock No. 495 comes in 18-inch lengths in a complete range of widths and thicknesses. Revised Starrett Catalog No. 25 "T" lists all sizes and prices. Write for your copy.

Starrett GROUND FLAT STOCK

Just Some Teeth Around a Blank . . . .



That, to some people, is a milling cutter and is comparable to designing an automobile by putting four wheels on a box.

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Milling Cutter Engineers

DETROIT, MICH.

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• The charge is only 20 cents for "A" and "B" quality blocks up to one inch in length: for longer blocks, 20 cents per inch of length. Minimum charge $1. Having your gage blocks checked periodically for wear or damage will eliminate possible errors in measuring.

FORD MOTOR COMPANY
Johansson Division, Dept. J
DEARBORN MICHIGAN

New Literature

(Continued from Page 46)

given in this circular. This new line of heavy-duty wrenches is "not only built for 'abuse' but equipped with 'abusing' accessories."

▼ ▼ ▼

"Cincinnati High Speed Universal Milling Attachment"—Bulletin No. M-748—a complete description with photographs and specifications regarding this new piece of equipment by the Cincinnati Milling Machine Company. Free on request to manufacturing executives.

▼ ▼ ▼

Pratt & Whitney John-Sons Roll Thread Snap Gages—a new circular describing thread, snap gages, triroll gages, and a new combination of tapper plain and thread, plug and ring gages. Handsomely printed and illustrated with graphic pictures of these various types of gages in actual use. Free on request.

▼ ▼ ▼

"Gisholt Standard Tools"—a catalogue illustrating and describing Gisholt Standard Tools for turret lathes. Contains information on standard chucking tools, bar tools, cross slide tools, Gisholt chucks, boring bars, reamers, and machine attachments. Free on request to responsible manufacturing executives.

▼ ▼ ▼

McCrosky Tool Company Bulletin No. 15-A on the McCrosky Super Adjustable Reamers. Profusely illustrated giving specifications and prices on adjustable reamers, adjustable chucking reamers, adjustable shell reamers, adjustable hand reamers, super reamers with special features. McCrosky floating holders, etc. Free on request.

Next Month . . .

This publication will feature "Tool Engineering" from a practical standpoint. George Stennett, Chrysler Corporation, Detroit, will be technical editor for this issue.

▼ ▼ ▼

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A MOVING UNIT
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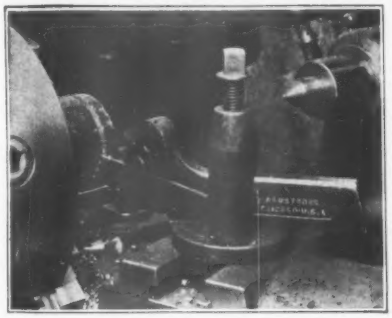
ARMSTRONG



No job will support waste

Today's competition, today's costs will tolerate no waste. Profits must come from greater efficiency. Where before tooling-up could be by trial and error, could be deliberate or faltering, present machine hour cost, man-hour cost, taxes and close figuring leave no cushioning margins. Today a delay can wipe out profit. There is no time for forging tools, for "tool dressing" and heat treating. Profitable work must start immediately, must proceed without interruption, must finish on schedule.

That is why today 96% of the Machine Shops use ARMSTRONG TOOL HOLDERS—permanent multi-purpose tools, that "Save All Forging, 70% Grinding, 90% High Speed Steel." With the complete Armstrong System you are **permanently** tooled-up, are always ready to start **earning** on any operation on any lathe, planer, slotter or shaper; for tooling-up is reduced to the selection of the cutter and adjustment for clearance.

You can build your Armstrong System, Tool Holder by Tool Holder, from the stocks of your nearest Mill Supply House. You can make the change over from haphazard tooling methods to dependable ARMSTRONG TOOL HOLDERS without disrupting production or special appropriation. Write for a B-35 Catalog today . . . then order as needed by number.

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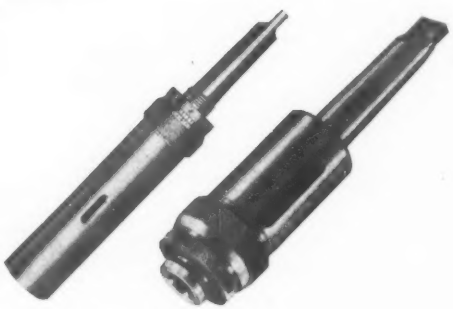
Buhr MICRO ADJUSTABLE HOLDERS



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One thousandth of an inch adjustment quickly made without tools or wrenches. Saves tools and set up time.

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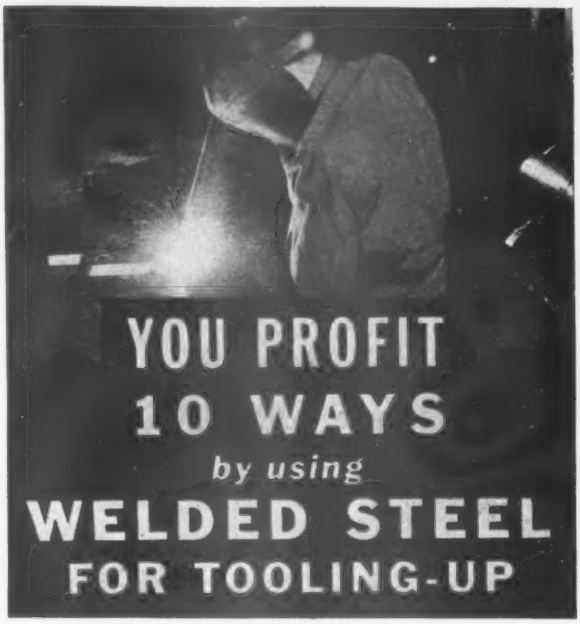

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Take stock steel parts, cut to proper shape, and *"Shield-Arc"* weld them into jigs and fixtures. It will pay you to use this simple tooling procedure, for these reasons:

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A.S.T.Eer Made Chief Engineer

Malcolm F. Judkins, A.S.T.Eer of Pittsburgh Chapter, has been appointed chief engineer of the Firthite Division of the Firth-Sterling Steel Company of McKeesport, Pennsylvania.

In this capacity, he will work with Firthite engineers, branch offices, and salesmen to extend the use of Firthite through personal calls, technical and sales correspondence, technical papers and talks before trade and engineering groups. His office will become a clearing house for exchange of information on new applications, improved practice and development work on Firthite.

Mr. Judkins graduated in chemical engineering from the University of Washington in 1928 and received his Master of Science degree from Carnegie Institute of Technology in 1929. He has also taken special courses at Carnegie-Tech in machine shop and management engineering.

Mr. Judkins is also chairman of the American Society of Mechanical Engineers, Sub-Committee on Metal Cutting Materials. He has been identified with engineering work in the Firthite manufacturing department since the beginning of the sintered carbide development.

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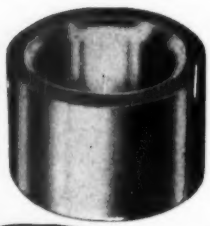

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From ¾ to 10 ton Pressure

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3½ to 8½ inch Jaws

Drill Press Vises

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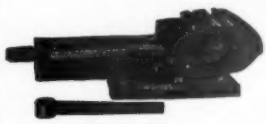
4½-6½ and 9 inch Jaws



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Control the speed of your cylinders. Make them function as fast or as slow as you wish, without affecting the pressure of course. Pipe one of these in the line from the operating valve to the cylinder, or if both the forward and reverse strokes are to be controlled, pipe one in the line to both ends of the cylinder.

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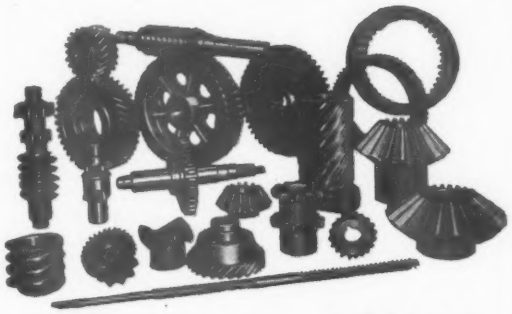
GEARS



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The most sensible tap holder that ever gripped a tap.

ONLY Procunier tappers have the patented three-point balanced heat treated gear reversing mechanism. This special feature distributes the pull among three gears instead of one, reducing strain and wear to the minimum and giving longer life.

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We've used "Unbrakos" around our plant for a good long time, so I know what I'm saying—those screws are so doggone accurate that every one can be driven home without giving you an argument. And what's more, they're tough, they'll stay where they're put and won't give up at the first sign of hard service. Take it from me—next time order

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Fig. 232

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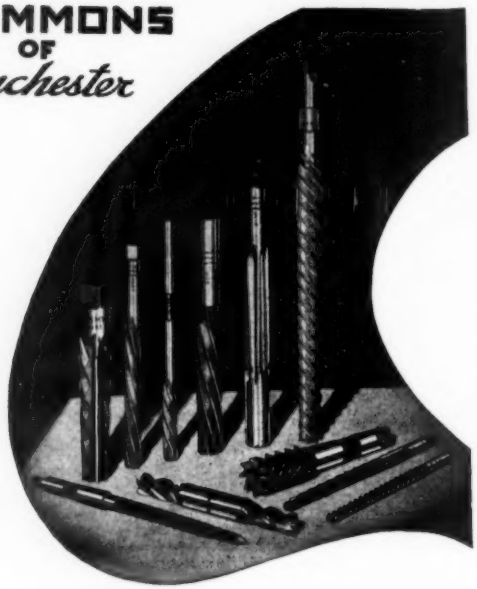

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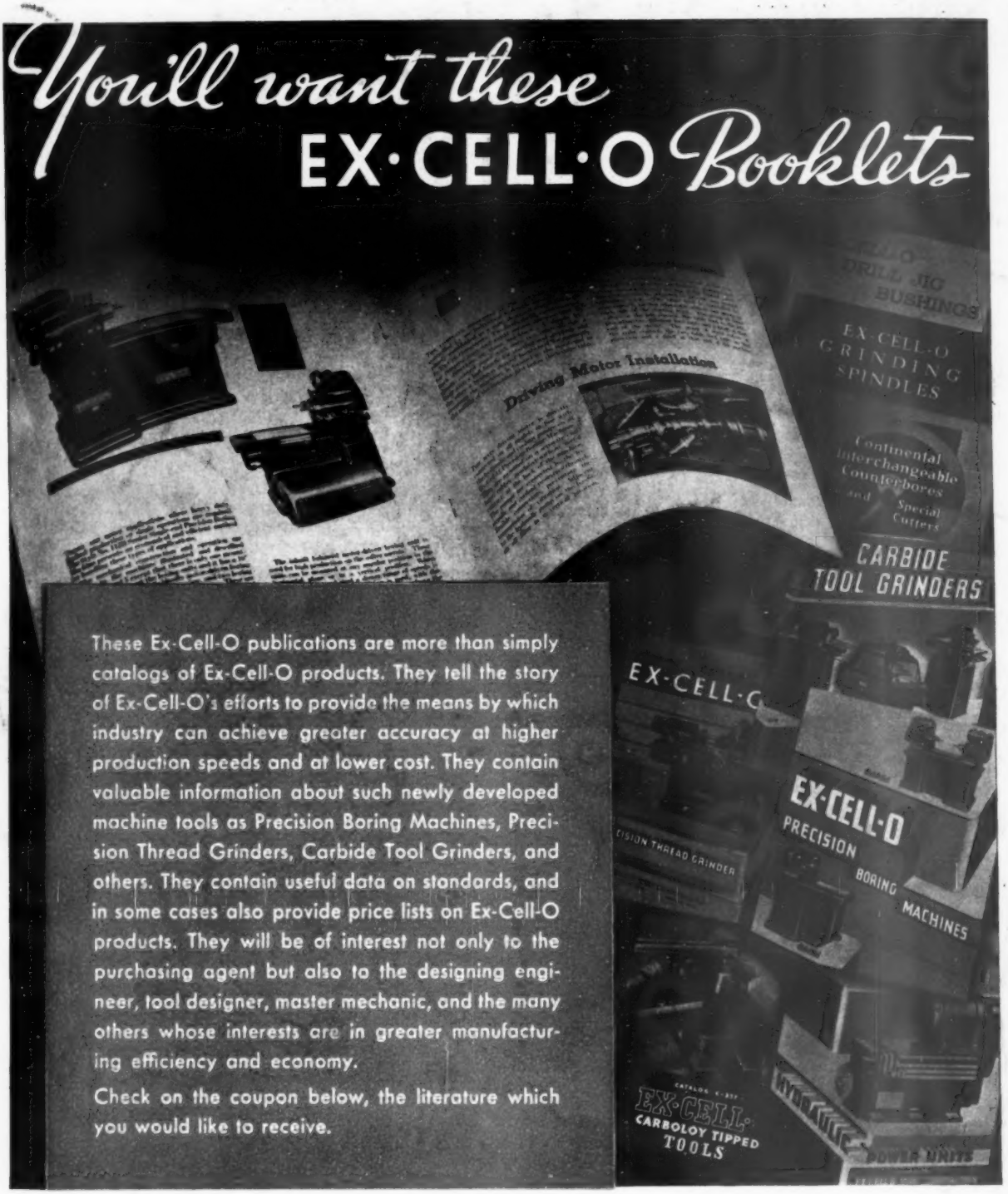

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